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THE TRANSMISSIBILITY OF DIPHTHERIA FROM ANIMALS TO MANKIND.

BY GEORGE FLEMING, F.R.C.V.S., ARMY VETERINARY INSPECTOR, WAR OFFICE.*

THE transmissibility of certain diseases of animals to our own species is a subject of great, and even of supreme interest and importance, when we consider that the majority of them are maladies of the most serious and fatal character. It is somewhat strange that while man is capable of receiving a number of disorders from different animal species, these receive scarcely any from him; so that the danger of transmission is nearly all on one side.

When I mention Rabies, Anthrax, Glanders and Farcy, Variola, probably a form of Enteric Fever, in all likelihood Tuberculosis, and very possibly Diphtheria—to say nothing of several parasitic disorders due to animal or vegetable organisms—it will be seen that the list of diseases which may be conveyed from animals to man is a formidable one, both in quantity and quality. And what renders the subject still more interesting, is the fact that from time to time another disease is added to the list of scourges we receive from our co-denizens.

Persons who mix much amongst animals are, of course, most exposed to disease from them; but, nevertheless, they who may

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have no communication with them at all are not exempt, as the flesh or milk they consume, or the articles or materials of animal origin which they handle, are vehicles by which they may become infected.

Looking to the discoveries made in the past, it is not at all unlikely that we shall find that other diseases whose origin is as yet unknown, or unsuspected even, are derived in some way or other from animals. Tuberculosis is the last disease added to the list of those which may be transmitted—judging from analogy and a few pathological facts—to the human species; and we have now to discuss whether Diphtheria may not also be transferred from animals to man, and if so, by what channel or medium.

The serious nature of this disease, its fatality, its alarming complications and troublesome *sequelæ*, and its appearance oftentimes in an epidemic or epizoötic form, render it worthy of the closest study, and particularly with reference to its origin and prevention.

Diphtheria, or Diphtheritis, as is now well known, is not only a very contagious and infectious disease, but also—thanks to the very careful investigations and experiments of Hüter and Trendelenburg, Nasiloff, Oertel, Eberth, and more recently of Talamon—inoculable, and due in all probability to a special parasitic vegetable organism, which can be cultivated artificially. This organism has been discovered in the blood, urine, and other excretions and secretions, as well as in the morbid products of the malady, but particularly in the false membranes which form on the surface of mucous membranes, and constitute a very marked and characteristic feature of the affection.

Of the parasitic nature of Diphtheria there can now scarcely exist a doubt. M. Talamon, one of the latest investigators, has succeeded in cultivating the microscopical organisms from diphtheritic matter derived from eight cases occurring in mankind. In the condition of complete development they presented a characteristic mycelium and spores. The former are tubes with partitions, at intervals, from two to five thousandths of a millimetre in length. These, under favourable circumstances, elongate and bifurcate, the bifurcations being characteristic in consequence of their in-

curved branches, like the sides of a lyre. In other conditions the mycelia do not become elongated, although they multiply so as rapidly to cover the surface of the cultivation liquid; they remain short and assume irregular forms, and give rise to numerous straight rods. The spores are of two kinds, round or oval, which may be termed the spores of germination, and rectangular spores or conidia. The latter characterise the species. They form small rectangles of various sizes, their length being sometimes fifteen thousandths of a millimetre. They may be isolated or united in festoons or zigzag chains. At first homogeneous, they soon become filled with small round granules, highly refracting, and of the size of ordinary micrococci. The round or oval spores are those which, by their elongation, constitute the mycelium. They appear as clear points, from three to five thousandths of a millimetre in diameter, in the middle of a mass of granular material. M. Talamon has inoculated this organism into the mucous membrane of the mouth or nose, or has given it with the food, in six rabbits, two guinea-pigs, four frogs, a fowl, and four pigeons. The rabbits died at the end of six, eight, ten, and eighteen days. That which died soonest presented an enormous swelling of the neck, resembling the œdema of the neck in Diphtheria, and due to a serous infiltration of the connective tissue, and the culture of this serosity showed the same organism with the characteristic conidia. The rabbit which died at the end of eighteen days presented a bilateral fibrinous Pleurisy, with effusion. The effusion and pleuritic membrane also yielded, on culture, the organism which had been inoculated; and it could be recognised either by simple microscopical examination or by culture, in most cases in the liquid contained in the pericardial and peritoneal cavities, and often in the kidneys. The organism was never obtained by cultivation of the blood contained in the heart. The liquid either remained clear, or presented only ordinary bacteria. In the four pigeons M. Talamon succeeded in producing characteristic false membranes. He first scratched the mucous membrane of the mouth with a bistoury, and then placed some of the cultivated organism in the interior of the mouth. At the end of twenty-four hours a thick membrane lined both sides of the mouth, the tongue, the false palate, and

the back of the pharynx. It was yellowish-white in colour, and was formed like the diphtheritic membrane in man, by epithelial cells, fat, micrococci, and bacteria. There were very few of the rectangular conidia, but these were abundantly obtained from the membrane by cultivation. Two of the pigeons died at the end of three days. In one the entrance to the larynx was covered by false membranes, and the trachea was full of a thick mucus, from which the organism was obtained by cultivation, as also from the pericardial and peritoneal liquids, but not from the blood. The third pigeon remained ill for eight days, and then the false membranes became separated and the animal recovered. At this point, unfortunately, the experiments have been for the present arrested. They were carried on in the laboratory of the Hôtel Dieu, and some of the physicians, fearing lest some of the organisms might contaminate their patients, stopped the observations.*

Diphtheria has been most carefully studied in man, in whom it is generally localised in the fauces, or pharynx, in the upper air passages, in the spleen and kidneys less frequently; it also involves the nervous system. The peculiar greyish-white membrane or slough which marks the presence of the disease, and is so closely adherent to the mucous membrane beneath, is constantly found in the mouth or pharynx, not beyond; for when the larynx and trachea are involved, the pseudo-membrane formed in them is of a croupous nature, easily detached, and does not usually occasion any loss of tissue when removed.

It is only in recent years that it has been closely studied in animals, though it must be confessed that from the comparative rarity of outbreaks, and the anxiety always manifested to avert loss by stamping it out, much still remains to be accomplished in this study.

The greatest number of outbreaks have been observed in poultry, among which, as well as other kinds of animals, it usually appears in an epizoötic form. Among fowls it is most infectious and fatal. After them the bovine species appears to suffer most frequently; then sheep, the pig, rabbit, and, finally, the dog and cat—the horse being almost exempt from its invasion,

* The *Lancet*, April 9th, 1881, p. 589.

according to some authorities, and as liable as the ox, according to others.

In animals, Diphtheritis is, as in man, a general as well as a local disease, and is manifested by acute fever, increased temperature and respiration and pulsation, succeeded by prostration and rapid emaciation, often by sudden collapse: the symptoms varying not only in individuals or species, but in different outbreaks.

In one outbreak, and usually most frequently, the respiratory passages will be chiefly involved—the nostrils, pharynx, larynx, trachea, and bronchial tubes, and even the lungs and pleural membrane being implicated, though the upper air-passages are oftenest the seat of pseudo-membranes. The symptoms in any case are very marked.

In another outbreak the digestive tract will offer the most marked lesions. The buccal, labial, lingual, pharyngeal, and palatine mucous membrane, as well as that of the nostrils and upper air-passages, is swollen, congested, red or violet in colour, and covered in patches by greyish-yellow, tough, fibrinous masses, which are with difficulty removed; though from time to time portions are detached and coughed out, or are carried away by the saliva or nasal discharge, leaving raw surfaces. Deglutition and respiration are performed with difficulty, and the upper part of the neck or throat is swollen and painful. Diphtheritic Enteritis is not at all uncommon among animals, and is usually complicated with disease in the mouth and pharynx. Diphtheritic Ophthalmia is not an unusual accompaniment, leading to perforation of the cornea, and destruction of the eye; and in bovine animals fibrinous deposits have been observed between the digits and around the pasterns, and the hoofs, and even the horns, may be shed. In animals suffering from Diphtheria, when there happen to be sores or abrasions on the surface of the body, these are very often covered with diphtheritic exudations; while beneath the skin in various regions are sometimes found nodular masses of the same nature as the false membranes. The bladder may be involved; and in pregnant animals abortion takes place when the uterine mucous membrane is also the seat of diphtheritic inflammation.

I mention these symptoms and lesions to show that animals

are subject to Diphtheria, and that it is in them a most formidable malady.

I have said that it is usually observed in an epizootic form, and that during different outbreaks it will assume special features, particularly with regard to localisation of lesions, symptoms, and especially nervous phenomena, which are at times very distinct. But, generally speaking, the disease most frequently affects the mouth, pharynx, pituitary membrane, larynx, and eyes, and less frequently, perhaps, the thoracic and abdominal organs.

In the majority of cases death sets in rapidly, and is due either to asphyxia, from obstruction in the air-passages, to blood-poisoning (if I may employ the term), or to prostration or sudden collapse. A fatal termination often takes place within two or three days from the first appearance of the symptoms, though in some cases death may not ensue for as many weeks.

An outbreak of Diphtheria in animals commences as in other contagious disorders, one animal is first attacked, then another, and so on, until all, or nearly all, have been affected. It is readily transmissible from one animal to another of the same species, and also to other species. In fowls the extreme facility with which it is spread is largely due, I think, to the healthy fowls picking up with avidity the mucus and shreds of diphtheritic membrane ejected by the diseased. There are many instances recorded in which creatures of other species have been infected from poultry—calves, sheep, and people. In all species young creatures are most predisposed, and this is most marked in the bovine species, the malady being almost entirely confined to animals under a year old.

Of the contagious or infectious nature of the disease in animals there can be no doubt whatever, as there is an abundance of experimental evidence, to say nothing of the recorded cases of accidental transmission, to prove this. Human Diphtheria has been experimentally transferred to rabbits and poultry, and from these to other animals. It has also been accidentally communicated. There is an instance published of a dog which had eaten the fæces of a child affected with the disease. Within a few days the animal died, and on examination of the

carcase there were found ulcers on the soft palate, and pseudo-membranes on the respiratory mucous membrane.

As has been mentioned, instances are recorded of transmission of Diphtheritis from animals to mankind, and this transmissibility is of the greatest moment to us at present. Seeing the terrible fatality attending attacks of the disease in our own species, and the mystery that often surrounds the origin of these outbreaks, nothing should be left undone to discover their real source or sources, with a view to prevention.

Between individuals of the same species the disease is very infectious, and the severity of the attacks and mortality appear to be greater than when it is transferred from one species to another.

The Veterinary Professor Dammann, of Eldena, now Director of the Hannover Veterinary School,* a most trustworthy observer, describes an outbreak of Diphtheria which took place among calves in 1876, with transmission to man; and as the relation of the bovine species to our own, so far as food is concerned, is closer than with any other animals, we may glance at the salient points of his narrative.

The veterinary inspector of Ludwigsburg reported that in the course of the previous winter and spring, nearly all the calves in the district—about twenty in number—had died during the first two or three months after birth. At Dammann's request, the body of one of the calves—between two and three weeks old—was sent to him on the day of its death. The appearances in the region of the head, which was most involved, were as follows:—On opening the mouth, the anterior part of the hard palate was observed to be covered with, or transformed into, a greyish-yellow mass. When a section was made of the head, it was found that this mass involved the entire substance of the soft palate, penetrating to the bones, and forming a layer of from one to five centimetres thick. On the right side the mass had made its way into the nasal chamber. Both cheeks were swollen, and when cut into, showed the connective tissue spaces occupied with this fibrinous material; the buccal surface also was covered, but not

* "Deutsche Zeitschrift für Thiermedicin und Vergleichende Pathologie," 1877.

invaded by it, and much more thickly than the palate. Towards the gum, in the vicinity of the molars, there was a mass about six centimetres in length, and nearly three in thickness, one border of which passed imperceptibly into the substance of the mucous membrane, which was destroyed, and the muscular layer exposed. The mucous membrane of the larynx and trachea was swollen and red, and here and there covered with small purulent masses, but its texture was not destroyed. Both lungs, but especially the right, contained in the anterior lobe a great number of small abscesses, some of which projected in a marked manner above the surface, and the interlobular connective tissue in the neighbourhood had become infiltrated with a gelatinous material, and was consequently œdematous. A similar material was observed between and around the toes. Dammann visited Ludwigsburg three days afterwards, and found five calves ill—two in the early stage of the disease, two very advanced, and one on the point of death. The latter had been apparently convalescent a few days previously, but relapsed. The chief symptoms were great dulness and prostration; the animals had no appetite; lay much; there was high fever; frequent short and husky cough; they had great difficulty in standing, the joints being extremely stiff; and saliva flowed from the mouth. There was more or less swelling of one or both cheeks. The inspector himself was suffering from severe sore throat, but his case will be alluded to hereafter.

The disease was evidently contagious, though notwithstanding that a number of calves had died within a short time, this cause was not suspected.

Dammann had two sick calves sent to Eldena for observation and experiment. He placed them, on May 10th, in a large space in his experiment-stable, so that they could move about. Next to their place of confinement was an aged cow, and he bought a healthy three-days'-old calf, and placed it with them. One of the sick calves was submitted to medical treatment; the other, designated No. 1, was left to nature.

On May 11th, No. 1 was very weak, stood with difficulty, drank little, saliva escaped from the mouth, and yellow matter flowed from the nostrils; there was weak cough and diarrhœa.

The entire tongue was swollen, and at the posterior part was a large yellow mass. The temperature stood high. The symptoms increased in intensity until the 15th, when the animal was very stiff, swallowing was difficult, and the breathing laboured and stertorous. The fæces contained many micrococci and small rods. The animal died during the night. On examination of the body early next morning, it was noted that *rigor mortis* was absent.

The blood in the vessels of the head was dark-coloured. The whole of the small intestine was deeply injected, and studded here and there with prominences of a yellow colour, and about the size of peas. The cæcum, colon, and rectum were studded with similar deposits. The mesenteric glands were also enlarged, softened, and greyish-yellow. The right pleural cavity contained about a litre of pus, and the membrane itself was covered with a yellowish-grey fibrinous mass. The pericardium was in a similar condition. The right lung was in places adherent to the side; its right anterior lobe was firm and impervious to air. The posterior lobe, when incised, presented numerous grey and dark-brown patches, varying in size from that of a pea to a hazel-nut. The nasal and tracheal mucous membrane was here and there covered by a purulo-fibrinous mass, though there was no loss of substance. The inner surface of the larynx, on each side, showed two yellow deposits, and on the epiglottis some small roundish yellow masses.

The left side of the tongue, towards the dorsum, and over the entire side, was covered with the same yellowish-grey mass, which involved the mucous membrane, and even the muscular tissue beneath, and was firmly adherent to them. A small deposit of the same character was attached to the hard palate.

The other calf was treated with salicylic acid, and recovered after a serious illness of about a fortnight's duration.

The healthy calf that was put with these two sick calves from Ludwigsburg showed the same symptoms of illness five days afterwards. It remained without treatment for four days. On the second day micrococci and rods were found in the discharge from the nose. On the fifth day the attendant administered a dose of salicylic acid without orders, and continued it until the

eighth day, when it was stopped. On the twelfth day the calf showed a swelling on the cheek; this was opened. Recovery took place about the thirtieth day.

Microscopical examination of the deposits on the mucous membrane resulted in the discovery of numerous bright-looking granules. They were scarcely tinted by carmine, nor were they soluble in chloroform, æther, acids, or alkalies. When isolated, they showed decided movements—they were micrococci; there were also rods. These organisms were found in greatest abundance on the superficial portion of the mass, although they were observable in every part; and not only in the pseudo-membranes in the mouth and pharynx, but also in those found in the intestines and about the feet. The result of Dammann's microscopical investigations was to establish a very close similarity, if not absolute identity, between the Diptheritis of calves and that of mankind. He remarks that the Diphtheria of calves is a general as well as a local disease. The lesions are most frequently found in the mouth (cheeks, tongue, and palate) and pharynx; next in the nasal cavities, larynx, trachea, lungs, small intestines, and cleft of digits. In the mouth, the preferential seat appears to be the cheeks, then the tongue and palate.

The principal symptoms are difficulty in standing, stiffness, fever, prostration, and dulness, and the recumbent position, loss of appetite, and difficult deglutition. The temperature is, of course, much increased. There is an absence of thirst, and the diminished appetite may be due to the pain of eating and swallowing. The salivation is most marked, particularly at the height of the disease, and the swelling of one or both cheeks is also a notable feature. This swelling is circular, hard, painful, and extensive. On inspecting the mouth, there are seen more or less extensive yellow or yellowish-grey deposits, variously prominent, on the mucous membrane of the palate, tongue, or cheeks. When opening the mouth is too painful, then the fingers can detect the existence of the pseudo-membranes on the cheeks, at the part corresponding to the external swelling. The presence of micrococci is diagnostic of the disease.

When the disease affects the trachea and lungs, cough is present; when the intestinal tract, then there is diarrhœa, the

fæces containing micrococci. The seat of the malady is primarily in the cavity of the mouth and in the nasal chambers; when the lungs are affected, this is probably due to inspired particles of matter from these cavities; and when the intestines are implicated, it may be suspected that portions of the exudate in the mouth have been swallowed.

The mucous membrane is not alone involved, for in Dammann's first case the palate bones were perforated, and a communication established between the mouth and nasal cavity. I believe the cavities of the nose are rarely involved in the diphtheritic process in man. Nevertheless, Nasiloff mentions some instances he observed in children.*

The contagium is both fixed and volatile, according to the observations made at Ludwigsburg, where the cases appeared at some distance from each other, as well as when animals were in actual contact. It appeared to be also very resisting to external influences, for when the sheds were occupied by fresh calves three-quarters of a year after they had been cleared out, these became affected in turn. Only very young calves were attacked —their ages ranging from a few days to some weeks; cows were exempt during the entire outbreak. This exemption was attributed to the greater thickness of the epithelial covering and density of their mucous membranes, which in young animals are softer and more vascular.

The period of illness was from three to five days, and without active and timely treatment all those attacked perished.

Dammann placed a piece of diphtheritic deposit in the mouth and nostril of a four-days'-old lamb. It was ill two days afterwards, and died on the fourth day. The lesions were those noticed in the diphtheritic calves. Another lamb had a piece of diphtheritic mass from a calf placed in its mouth. It remained unaffected. A year-old rabbit was inoculated in the muscular part of the thigh, and died the following day. There was a foul-looking greyish deposit around the seat of inoculation, the fascia was of a greenish-grey colour, and for some distance around the wound there were hæmorrhagic patches in the muscular tissue. Micrococci were found in the blood. Another older rabbit was

* Virchow's "Archiv," band l., p. 550.

inoculated in the same place as the last, with a small portion of the diphtheritic mass from a calf's tongue. It also died next day, and the lesions were similar. An incision was made in the conjunctiva of the right upper lid of the eye of a one-year-old lamb, and a morsel, about the size of a pea, of the diphtheritic deposit from the tongue of the calf No. 1 was inserted. In two days the eyelid was very much swollen and the conjunctiva red and turgid, with a discharge from the eye and covering the cornea, as well as a yellow patch on the membrane, some distance from the point of inoculation. There was fever and loss of appetite. On the following day the inoculated mass had increased to the size of a bean, and the next day it was still larger, and the entire cornea was opaque, yellowish-green in hue, and where the yellow patch first appeared the part was very prominent and covered with unhealthy pus. Eight days after inoculation, the cornea was removed. It was very much thickened, and when examined microscopically was found to be infiltrated not only with pus corpuscles, but throughout with myriads of micrococci. Another lamb was inoculated in the same region, but the effects were more severe.

These experiments proved in the first place, that not only was Diphtheritis of the calf transmissible to lambs, by simply placing a small portion of exudate in the mouth, and without abrading or wounding the mucous membrane, but they also, in the second place, demonstrated the extraordinary similarity, if not absolute identity, between this Diphtheritis of calves and that of mankind, the specific processes following inoculation, and observable in the conjuctivæ and corneæ of the lambs, no less than in the muscular tissue of the rabbits, being in no perceptible manner different from those noted in inoculations from human Diphtheria. The rapidity with which infection takes place is also well shown in the case of the rabbits, death occurring in twenty-four and twenty-five hours.

The most important part of the narrative is yet to be alluded to. At the suggestion of Dammann, the veterinary inspector of Ludwigsburg commenced on April 29th to treat the diseased calves by dressing their mouths with salicylic acid. On May 1st, in the evening, he experienced a severe pricking sensation in the

throat; nevertheless, the treatment of the calves was carried out most conscientiously. On May 5th he had to stay at home, and when Dammann saw him on the 9th he was in bed, very feverish, suffering from pain and dryness in the throat, great pain in swallowing, weakness of the limbs, pain and heaviness of the head, and thirst.

The cervical and submaxillary glands were swollen and tender, and the mouth was opened with difficulty. The mucous membrane was of a dark-red colour, and the soft palate and one of the tonsils were very tumefied, and appeared to be covered by a greyish-green membrane. On this day surgical and medical treatment was adopted, and on the days following, pieces of greyish-white membrane were detached by the brush employed to dress the fauces. The local disease was under treatment for ten days, but the general weakness continued until the end of June.

About the same time that the inspector was suffering from treating the sick calves, the dairymaid who attended to them was also infected, though not so severely, as she had not to go to bed. The symptoms were the same. Dammann also learned that besides these persons who had been in more or less close contact with sick calves, others in this locality had been suffering from sore throats.

Dammann himself, on May 8th, two days after he had examined the carcase of his first diphtheritic calf, had a pricking sensation in his throat; and his assistant, after dressing the mouth of one of the calves from May 11th to the 14th, had also this symptom, as well as pain on attempting to swallow. Salicylic acid gargles, at once resorted to, and continued for some time, caused the symptoms to subside and finally disappear.

As to the origin of the outbreak, nothing could be discovered, and the question as to whether it was due to transmission from mankind remained undecided. Certain it is that, at the commencement of the outbreak among the calves at Ludwigsburg, in the winter of 1874-75, the child of a coachman died of Diphtheria.

I have dwelt thus lengthily on Dammann's report, as it is most carefully drawn up, and more especially as he is considered

a very reliable authority in Germany; and also because the relationship of the bovine species to mankind is so intimate.

Nothing more definite is known with regard to the transmissibility of Diphtheria from bovine animals to man. But of the frequent existence of the disease in these creatures there is ample evidence, and there is even some casual proof that this communicability may be a more common occurrence than is generally suspected. A recent French writer, M. Lenglen, of Arras,* describes an exactly similar malady to that investigated by Dammann, but which he (Lenglen) designates as Gangrene of the Mouth (*Gangrene de la bouche*). He witnessed it chiefly among calves, though he admits it is not special to the bovine family, as he had observed two cases of it in foals—one fifteen days old, the other about five weeks, and in lambs from fifteen days to six weeks. He did not think it was contagious, though he prescribes sanitary measures as if it were so.

Mr. Macgillivray, veterinary surgeon, Banff, also describes the same disorder, under the name of "Tubercular Stomatitis,"† and which he asserts has been very common in his practice for fifteen years. Though it chiefly occurred in calves, yet he had not unfrequently met with it in one-year-old cattle, once in a cow, and once in a horse. The symptoms were at first profuse salivation, very fœtid breath, and difficulty in mastication. On inspection of the mouth, the lesions were observed inside the cheeks, about the tongue, gums, and the pharynx, or very rarely about the entrance to the larynx. He describes the malady as consisting in a cheesy deposit in, or degeneration of, these parts. When in the buccal region, this deposit is generally greyish in colour externally, yellow internally. He is of opinion that it is highly contagious. He gives strong evidence in favour of this contagiousness, and the description of his cases is very interesting, as showing their identity with those recorded by Dammann. But I believe he erred in considering them as of a tubercular nature, for there is evidently nothing analogous to Tuberculosis in the lesions; and, besides, calves are extremely rarely affected with Tuberculosis, while sheep and horses (which he asserts he has

* "Recueil de Méd. Vétérinaire," 1880, pp. 969, 1091.
† VETERINARY JOURNAL, January, 1881, p. 1; June, 1881, p. 377.

seen attacked by the disease) are almost entirely exempt from it. The malady was evidently Diphtheritis, as described by Dammann; and in discussing its etiology he makes some remarks which are extremely pertinent to the purport of this paper. He says, referring to one outbreak: "An interesting point arises in reference to the origin of the disease, namely, as to whether it was inherent in the first calf and communicated by it to the others, or were the whole six contaminated by the milk from the two tuberculous cows? . . . . If the disease was communicated to the calves by the milk, the question presents itself as to whether the use of the same sort of milk may not account for the occurrence of certain cases of sore throat or mouth in the human consumer. *Isolated cases of sore throat often occur among farm servants*, where ugly-looking yellowish spots or deposits are found in various parts of the throat, and even the mouth, requiring a good deal of brushing and dusting with very strong caustics. . . . . That the Tubercular Stomatitis of calves is contagious, is amply demonstrated in this communication; for whether we consider it as passed from calf to calf in the cases chronicled, or as conveyed to all by means of the milk, the fact still remains that it is transmissible. For my own part, I firmly believe that one calf conveys it to the other, not only by actual contact, but also if the calves are sucking the same cow, or getting their milk out of the same dairy utensils, as often happens. . . . . Whether, therefore, the contagion comes from the milk originally, or from calf to calf, if it gain access to mucous membrane of cheeks, gums, tongue, or throat, it produces in a more or less aggravated degree the Tubercular Stomatitis," etc.

A most serious question here arises as to the relationship of this disease of calves and human Diphtheria. If the disease in the calves is produced by the milk of the cow, why may not this milk also produce the same malady in man? There is nothing at all improbable in this, looking at Dammann's experience and Macgillivray's reasonable suppositions. On one notable occasion—that of a somewhat recent outbreak of Diphtheria in the human species at Kilburn, London—it was suggested that the malady most probably owed its origin to the existence of what is com-

monly known among cow-keepers as "Garget," to veterinary surgeons as "Mammitis," or "Mastitis," among cows in a certain dairy, from which milk had been distributed; and the question arose as to whether there was any possibility of such an origin for Diphtheria. If the disease could be originated and transmitted in such a manner, then a most important discovery would have been made with regard to at least one source of a scourge, the origin of which is involved in mystery.

Is there any disease of the mammæ, or udder of the cow, which will, through the medium of the milk, produce Diphtheria in mankind? At present we are without evidence to this effect. If we regard Diphtheria as a specific disease, due to or characterised by the presence of certain microscopical organisms, as has now been well established, then we must trace the origin of outbreaks of the disorder to a diphtheritic source. I know of no malady specially affecting the lacteal apparatus of the cow which is of the nature of Diphtheria. The disease, as we have seen, attacks young calves, very rarely cows, and is, if not at first then very soon after, a general disorder. The question may be asked, Where do the calves receive Diphtheria from? And to this we cannot, as yet, give a satisfactory reply. As milk is their only food at this early period of their lives, then it would seem probable that the disorder is conveyed to them through this medium, and that this fluid has been contaminated by being drawn from a diseased gland. But, as I have said, we have no evidence of the existence of diphtheritic inflammation in the udder of the cow, though there is no reason why such a condition might not be present on rare occasions—for frequent they cannot be, else they must have been noticed.

There are three kinds of Mammitis—catarrhal, interstitial, and erysipelatous. But a diphtheritic kind has not, to my knowledge, been yet distinguished. Mammitis, as we know it, is most frequent when the mammary glands are active, and particularly soon after parturition; it may be due to the most varied causes, as injuries, influence of cold or variable temperature, overstocking the gland, or allowing the milk to remain too long in it, improper food—anything, in fact, which disturbs the functions of a very vascular and active secretory gland.

But there has not unfrequently been observed a form of Mammitis of a phlegmonous or erysipelatous nature, which has assumed an epizoötic or enzoötic character, affecting large numbers of cows in a district, and causing serious loss, so far as the production of milk is concerned. There is every likelihood that this form is contagious, and that the milk is dangerous as food. I am not aware that it has been observed in this country, but it has been reported upon by most excellent veterinary authorities in Germany. For instance, Professor Zurn, of Leipzig, relates* that in the summer of 1874, in a certain district, six or eight cows were affected, while grazing, with a disease of the udder. Isolated cases occurred during the following winter and summer of 1875, but in the winter of 1875-6 the malady again showed itself to an alarming extent, no fewer than forty cows being attacked out of a herd of 180.

The animals were sometimes ill for several days before the prominent symptoms of the disease were noticed. These were the presence of a watery secretion from the udder, containing coagulated masses, which gave rise to much pain as they passed through the canal of the teat; sometimes the secretion looked like white or yellow pus; the gland, as a rule, remained soft, and the temperature was seldom raised. One or more quarters of the gland were involved, and one attack did not protect from another. In many cases the part of the gland affected was totally destroyed. Dry cows (*i.e.*, cows not in milk) were attacked, as well as those in which the secretion was abundant. Suckling ewes and sows were infected from the cows, after lying or rolling about on the litter and dung from the cowsheds in which the diseased cattle stood; while the milk from these killed the calves, and that of the ewes and swine the young lambs and pigs. The samples of milk examined by Zurn did not all present the same appearances, though all were acid. When allowed to stand for some time, a greyish-white sediment settled at the bottom of the vessel, while the supernatant fluid was of a citron or dark-yellow colour, seldom of a light-green tint. After a time a very thin layer of cream formed on it. The sediment contained a large quantity of epithelium and pus-cells, and a great

* "Deutsche Zeitschrift für Thiermedicin," 1877, p. 381.

number of motile micrococci, which in two or three days lost their movement, clustering together and forming masses of zooglea. When the fresh milk was examined numbers of intertwined rod bacteria, forming a kind of feltwork, were noticed. Besides these, there were many cells from ·004 to ·005 millimetre long, and ·002 to ·0025 millimetre broad.

In all the cultivations made by Zurn, and which extended over a year, there never appeared any fungus except thin flocculi, composed of chains of *Torula*, resembling the yeast fungus. In other specimens the *Mucor mucedo* spores were found, which grew extensively when the milk was left for any time.

Zurn attributed the outbreak and extension of the malady to the micrococci and rods observed in the milk.

A similar disease has been reported upon as existing among cows, by Professor Dieckerhoff,* of the Berlin Veterinary School, who designated it "Infectious Mammitis." It was due to local infection, and to no other cause, so far as could be traced; it commenced at the extremity of the teat, gradually extending into the milk sinuses and interior of the gland. The malady was conveyed from one farm to another by persons who handled the cows.

Professor Franck, of the Munich Veterinary School, had previously drawn attention to this infectious Mammitis in the cow, which he discovered to be due to bacteria.† It could readily be produced experimentally. The readiness with which it could be transmitted was doubtless due to the peculiar structure of the teat and arrangement of the milk sinuses and ducts in ruminants, as well as to the habits of these animals.

Rivolta, Veterinary Professor in the University of Pisa, also describes an infectious Mammitis in sheep, special or specific in its character, a kind of septic disease.‡ But we have no mention of Diphtheritis affecting the udder; though there is no reason why the mucous membrane of that gland should not be involved

* "Wochenschrift für Thierheilkunde und Viehzucht," 1878; VETERINARY JOURNAL, 1878, p. 335.

† "Handbuch der Thierarzlichen Geburtshülfe."

‡ "Giornale di' Anatomia, etc., degli Animali," 1875; Fleming's "Veterinary Obstetrics," p. 695.

as well as other mucous membranes. Indeed, there is no difficulty in understanding that a calf suffering from Diphtheria, and applying its mouth to the teats of the mammæ might readily infect the gland, and through it the cow. Granted, therefore, that the malady is readily transmissible from bovine to bovine, and that the calf—leaving out of sight the manner in which it may become infected—may transmit the infection to the udder of the cow, there is every reason to assume that the secretion of the gland is rendered infective, and will convey Diphtheria to other creatures which consume it; and as mankind can receive the disease from the bovine and other species, there is scarcely any doubt that the disorder might become spread among people, and especially young children, by milk containing the diphtheritic germs which have been developed in the udder of the cow.

That the Diphtheria of animals is always derived from an infectious source may be assumed as a fact established by scientific research; that it is very similar to, if not identical with that of man, is evident; that it is transmissible from animal to animal, and from man to animals, we have accidental and experimental evidence to prove; and that it may be conveyed from animals to the human species, is also a fact that is supported by the instances recorded of accidental transmission.

It must be confessed, however, that there is much yet to be learned with regard to the disease, not only in animals but also in man; and it is now mainly to experimental pathology that we must look for a solution of the obscure points which are more particularly related to the mode in which the malady originates, and the circumstances which favour its extension as an epidemic or epizoötic scourge.

CONTAGIOUS PLEURO-PNEUMONIA IN ANGORA GOATS.

BY D. HUTCHEON, M.R.C.V.S., COLONIAL VETERINARY SURGEON, CAPE OF GOOD HOPE.

ON the 20th of March last I received a telegram from the Civil Commissioner of the Division of Bedford, informing me that a very fatal disease had broken out in a flock of Angora goats belonging

to Mr. Van Niekerk, of Brakfontein, and requesting me to come there at once and examine into the nature of the disease. I arrived at Bedford on the evening of the next day, and proceeded to Mr. Niekerk's farm on the following morning. I examined the goats, and made a *post-mortem* examination of a number of those which had died during the previous night. I found that the disease was Pleuro-pneumonia; but whether it was of a specific and contagious character, due to a special virus which had been carried by some means into the district, or only ordinary Pleuro-pneumonia, produced by some local influences, I was not prepared at once to give an opinion. I was certainly inclined to regard it as being of a non-contagious character: 1st, Because I had no previous knowledge of a contagious form of Pleuro-pneumonia which affected goats; and 2nd, The rapidity with which the disease had spread among Mr. Niekerk's flock, affecting more than 700 goats within a period of fourteen days, induced me to believe that its rapid spread could not be due to contagion alone, but to some local influence, such as the excessive rains, etc., which were prevalent in the district about that time; and that when the exciting cause should cease, and a change to more favourable weather ensue, the disease would disappear with the same rapidity as it had manifested itself. But after carefully watching the progress of the disease for three days, and noting the uniform character of the pathological appearances in the lungs of those that died, I began to realize that I had a specific disease to deal with. For further proof upon this point, I requested to be allowed to kill two goats which were suffering from the disease in its earlier stages, and an examination of the lungs of these removed all doubts from my mind as to its specific character, the pathological appearances being perfectly distinct from ordinary Pleuro-pneumonia. I now directed my attention to its contagiousness or otherwise. I had, immediately after my arrival, purchased six healthy goats, and placed them among Mr. Niekerk's affected flock, with the view of testing this point; but as I learned the history of the outbreak, and watched its progressive spread, I became convinced of its contagious character before these six goats became affected with the disease. Yet the fact that these healthy goats caught the infection, and

manifested the symptoms of the disease ten days after their introduction to the sick flock, added very important confirmatory evidence of its contagious or infectious character.

The history of the outbreak, as far as I have been able to collate it, is as follows:—Mr. H. David, of Somerset, South Africa, imported a number of Angora goats, rams and ewes, in the month of December last. These goats left Angora on the 1st October, 1880, and Constantinople on the 22nd. They arrived at Port Elizabeth, South Africa, about the middle of December; at Cookhouse Station on the 22nd, whence they were conveyed to Somerset in waggons, and kept in Mr. David's yard until the day of sale, January 26th, 1881. Mr. Niekerk purchased a ram at this sale, and it arrived at his farm on the 27th, when it was shorn and dressed with a solution of tobacco on the 28th, and on the morning of the 29th it was observed to be sick. It was then placed in a small house along with a ewe, which was suffering from some kind of lameness. The ram was carefully attended to, and ultimately recovered; but seven days after the ram became sick the ewe with which it was associated began to manifest the same symptoms as it had exhibited, and ultimately died. A *post-mortem* examination of this ewe showed that it had died from a species of "lung sickness." After this the ram was allowed to associate with about fifty lame goats, which were kept near the homestead for special attention. On the 26th of February these lame goats were reintroduced to the general flock, and on the 4th of March the lung disease began to manifest itself among them, after which it rapidly spread over the entire flock, consisting of 1,224 goats, proving fatal to 879 of their number.

It may be of some interest, as illustrating its character, if I record the course of its outbreak in several other flocks. On the 26th of February Mr. Niekerk sent a ram to Mr. Botha, of Goba Drift, obtaining one of the latter gentleman's in exchange. The ram that Mr. Botha received died on the 7th of March, and on the 22nd the first one of his general flock perished from the same disease; after which it spread over his entire flock of 720 goats, proving fatal to 530 of them. Mr. Botha sold about fifty "Kapaters" to Mr. Farr, a butcher in Bedford, on the 22nd of

March. These goats were herded on the commonage along with about a dozen belonging to a native, and meanwhile killed as they were required. Nothing was heard regarding them until the 16th of April, when one of the native's goats died from the disease. By this time Mr. Farr's goats had all been slaughtered; but, on inquiry, I ascertained that the lungs of those which were the last in being killed showed signs of the disease. From these goats the disease gradually spread to every flock grazing on the commonage. One other instance in this district will suffice. Mr. Leonard, whose farm adjoins that of Mr. Botha, had a flock of goats grazing in close proximity to where Mr. Botha's sick goats were allowed to run. At my suggestion, he removed them to the other side of his farm on the 24th of March, in order to avoid contagion; but on the 9th of April he observed one of his goats sick, and, on killing it, found that it was affected with the malady. The disease gradually spread over his whole flock of 363 goats, out of which only eighty recovered.

I placed six healthy goats among Mr. Niekerk's affected flock on the 23rd of March. Eight days afterwards two of them appeared dull and feverish-looking. I killed one of them, but the lungs presented no appearance of the disease. Four days afterwards I killed the other, and found that the disease had made considerable progress in the lungs. Two days later I killed three more, and found the disease in the lung lesions in each considerably advanced. I allowed the sixth one to die, which event took place on the twenty-second day after being introduced to the affected flock.

There was an outbreak of this disease in a flock of goats in the Jansenville Division, which is very instructive as showing how it might have been suppressed, had anything like intelligent energy been displayed by those in authority. A number of imported Angora goats, which came by the same ship as Mr. David's, but belonged to another gentleman, arrived at Mr. Cawood's farm, Mount Stewart, in the Jansenville Division, on the 23rd December. Mr. Cawood placed some of the Angora rams amongst sixteen of his goat ewes, and eight days afterwards took the ewes back to his flock of 460 goats, some distance off. Six days subsequently to their reintroduction to

the flock, his herdsman reported that one of the ewes was sick. This ewe died on the following day, and in about a week after all the sixteen ewes were dead. About four days after this occurrence the others commenced to die at the rate of ten and twelve a day. He removed twenty which looked healthy, and inoculated them; but these died. He then *drenched** about 100 of them, but they also died. He therefore cut the throats of the remainder and buried the carcases, and thus stamped out the disease. None of his other flocks have become affected, nor has the disease shown itself in any other flock in the district. What appears somewhat strange in connection with these outbreaks, on the theory of its introduction by these imported Angoras, is the fact that the disease has only shown itself on these two farms—I mean primarily—although the same shipment of goats has been scattered over a great portion of the Eastern Province of the colony. There were a number of these goats sick, and some died, after the purchasers had moved them to their respective farms. But in no other instance that I have heard of has the disease spread to the general flock. One explanation of this may be that these goats appear to have taken sick immediately after their arrival at these farms, and were kept carefully isolated from the general flock until after they were quite recovered. One instance of this I will relate. Mr. Wm. Nel, a farmer, near Adelaide, bought a ram and ewe out of the same shipment, taking them direct from Port Elizabeth to his farm. They were put into a house along with an old ram which Mr. Nel purchased from another farmer in the colony. The imported ram first became sick; about ten days afterwards the ewe was similarly affected. Both appeared very ill, but ultimately they recovered. Very soon after the old ram became affected; and although the same treatment was adopted as in the other two cases, it died. Mr. Nel opened it, and reported to me subsequently, when he had seen other cases, that this ram died from the same disease that is carrying off so many goats at present. Mr. Nel kept the imported ram and ewe apart from his flock for over two

* Drenching is taking the diseased lung and any fluid in the pleural cavity, mashing them all up together, adding some water, then straining out the solid portions and giving each animal a small quantity as a drench.

months, and up to the present time his flocks are free from the disorder.

From the above history, crude though it be, it will be seen that the disease has a period of incubation of from six to ten days, and during this interval there are no symptoms discernible except to a close observer. The first indication is a cough, a tendency to lie down, and to lag behind the rest of the flock; but not until the disease has made considerable progress in the lungs do the goats cease to feed. In fact, I have watched them feeding when the lungs were very extensively diseased, giving a grunt between each mouthful. When consolidation of the lungs has gone so far as to make breathing very difficult, it is then that the poor creatures lie down, and, with a fore-leg stretched out, utter a painful grunt at each expiration. In the last stages they stand with the mouth open, the tongue protruding, frothy saliva dribbling from the mouth, and bleating in a most distressing manner. The temperature ranges from 105° to 107° F., the normal temperature being 102° to 103° F.

Pathological Appearances.—The disease first makes its appearance in the lungs in a number of small nodules, about the size of a pea, and of a light yellow colour. Surrounding this nodule, in a spherical manner, is a congested ring, of a port-wine tint varying in diameter from one-eighth to one-half inch, according to the size of the nodule. These nodules are not confined to any particular part of the lung, neither are they arranged in any definite manner: they are limited sometimes to one lung, sometimes to the posterior portion of one lung, and are very often irregularly deposited over both lungs. These nodules enlarge in a spherical manner, and ultimately coalesce, when the whole lung or lobe becomes quite solid. The pleura-pulmonalis immediately over these nodules first becomes involved, when it looks like an abraded membrane, injured by friction. Later the whole of the pleuro-pulmonalis of the affected lung becomes thickened, and of a pale blue colour. There is very little fluid effused into the pleural cavity, but a considerable quantity of coagulated serum is found surrounding the pericardium, especially around its base. The lungs, in some cases, will be found adherent to the walls of the chest, but not with that firmness

characteristic of bovine Pleuro-pneumonia. The pericardium is generally full of a clear fluid, and both it and the fluid found in the chest coagulates on cooling. On examining this fluid with a microscope immediately after death, I found a great number of small bodies having the same shape and structural appearance as the blood-corpuscles, but varying a little in their size. These bodies displayed very active movements; at times throwing out processes, at others changing their form into every variety of shape. In addition to these, there were a great number of small circular bodies, about one-quarter the size of the blood corpuscles, which displayed very active vibratile movements. These latter increased wonderfully after the fluid had stood for a day or two. I also noticed a few, perhaps one in five hundred, corpuscles of very large size, about four times the size of the blood corpuscles, oval in shape, but apparently of the same structure as these latter. They did not display any movement.

I need hardly mention that there were many variations from the above description. In some cases, generally among those that were first affected in a flock, the disease in the lungs seemed to run its course more rapidly than ordinarily, the animal dying within a couple of days after being first noticed to be sick. In such cases I generally found that the pleural lesions were more extensive than the pulmonary. The state of the weather and sudden variations in the temperature exercised a considerable influence in either hastening or retarding the progress of the disease, as well as to lessen or increase the death-rate.

As far as my examinations have gone, I have not found any pathological changes in any other organ of the body except the heart, in which in two cases I observed the endocardium marked by dark spots, which appeared to penetrate the muscular tissue of the heart.

With regard to treatment, the universal demand of the farmers in this colony is for specifics to cure disease—something that will act like a charm after the administration of one, or at most two doses; while they ignore entirely the most ordinary hygienic measures. As a consequence, very few medicines have had a fair trial; but judging of the value of medicine in this disease by

its effects under the conditions that exist here, I am not inclined to put much faith in medical treatment at all. So far the flocks which have been the least disturbed by any medicines, excepting of the simplest character, have shown the largest per-centage of recoveries. I am inclined to favour a laxative and diuretic dose of medicine when the goats are first observed to be sick; then put them into a paddock or quiet place where they will not be disturbed or distress themselves by trying to follow the flock, and if at all possible put them under cover at night. If this plan were adopted, I believe a large per-centage would recover. Struggling with them, to give them any kind of medicine when very sick, evidently hastens their death. In this colony, unfortunately, there are many farms on which there are neither paddocks nor houses for stock to run into. As a consequence, animals which are affected with any disease, especially when such a disease involves the respiratory organs, stand a very poor chance of recovering, when exposed to such extremes of temperature as occur in this country at certain seasons of the year, and within the twenty-four hours.

I may just remark here that the flesh of these diseased goats is eaten with perfect impunity, both in the raw state by dogs, etc., and by the natives when cooked. I have eaten some of it myself, and could not detect anything different about it, either in taste or flavour, from healthy mutton.

Hitherto the disease, when once it had invaded a flock, attacked every goat in that flock, with two exceptions, which I will mention presently; and on an average about one-third recover, that is where they have a moderate chance. The two exceptions are—1st, One flock which I inoculated as soon as the disease broke out amongst them. This flock originally contained 127 goats. Four were dead before I inoculated, and six were sick: the latter I did not inoculate. Of the remaining 117, eighty-seven took the disease; of these twenty-three recovered, and thirty still remain free from it.

The second instance was in a flock belonging to Mr. John W. King, of Madjesfontens, in this division. This farmer has in all 1,800 goats, divided into three flocks. The disease showed itself in one of these flocks, and as soon as he observed it he

carefully isolated this flock from the other two. He then drafted out from this flock every goat as soon as it was observed to be the least dull, and turned it into a small paddock in front of his house. In this paddock there was a hut where the sick goats were put at night. All the severe cases he had killed at once, and buried, and the result is that the disease has died out, not above half the number of his flock became affected, and he has had no fresh cases for twenty-one days. He now meditates killing the small number that recovered. But notwithstanding such facts as these occurring before their eyes, neither the Government nor the farmers can bring themselves to deal with this disease in anything like a thorough manner. Mr. Cawood's energetic action shows clearly how easily it might be stamped out; and Mr. King's action proves that watchful and immediate isolation will cause it to die out; while its regular and consecutive spread indicates that the virus is not carried to any distance by the atmosphere. How long after an animal has recovered from the disease it might be put amongst healthy goats with impunity I have no statistics to determine; the only instance that I know being Mr. Nel's ram and ewe, which were put with the general flock about two months after recovery.

A very interesting question now remains, and I trust that you, Mr. Editor, with your wonderful sources of information, will be able to unravel it. Does this disease exist in Asia Minor? and does it manifest the same virulent characters there which it has done in this colony? Because, as I mentioned above, it is very strange that so few of these goats should become affected with the disease, unless they had it before. And, again, how was it that those few goats which became affected did not show the symptoms earlier, seeing that the disease has such a short period of incubation in this colony? One thing is clear, that they were the medium by which the disease was carried into this country; and, legislatively, there ought to be no difficulty in dealing with it. But on this question I cannot trust myself to speak, as I have been so disheartened and disgusted by the callous indifference manifested by our legislators in regard to this question.

I may mention briefly that neither sheep nor cattle can be made to take this disease. Sheep have been kept with infected

goats during the whole course of the malady through the flocks, and not one has been observed to be affected with it in its typical form. But several sheep which had been suffering from tubercle in the lungs died, and the pathological appearances in their lungs incline me to believe that the immediate cause of death was a modified form of this disease. I saw a similar instance in a calf which was kept in a shed with the diseased goats at night; but healthy animals do not take the disease.

I have been making more experiments with regard to the preventive effects of inoculation, but the further consideration of that point I must leave to another time.

[We are not aware that a contagious disease like that described by Mr. Hutcheon prevails among goats in Asia Minor. But we know little, indeed, of the maladies peculiar to that region, as veterinary science is all but, if not entirely, unknown there.]

ON A HORSE DISEASE IN INDIA KNOWN AS "SURRA," PROBABLY DUE TO A HÆMATOZOON.

BY G. EVANS, M.D., M.R.C.V.S., ARMY VETERINARY INSPECTOR. INDIA.

(*Continued from page* 88.)

B. *Remote Causes.*—The proximate cause of Surra Disease being the characteristic parasite in the blood, the remote causes are the conditions which bring the parasite into the system of the animal. If the fly which I mentioned, or any other, propagates the disease by inoculation, it is one of the remote causes. The parasite of Surra is so new to science that it has not yet been thoroughly studied. We know nothing of its natural history, excepting its appearance in the blood; though we know it must come from without, but how or whence we know not. I approach this subject, therefore, with the greatest caution and diffidence. My opinion is provisionally based upon a few facts, until more are obtained to confirm or to correct it.

All the lowest forms of organic life, whether of the animal or vegetable kingdom, must have water more or less stagnant for their development: whether it is a chemical or an organic solution they breed in, their growth is arrested as soon as the water is evaporated. Water, more or less stagnant, and more or less impregnated with a chemical or organic solution, and having a certain temperature, is essential to their origin and development. An organic fluid—such as blood, or an infusion of hay or grass—is more favourable than a chemical solution. Some of them have several states of being. When they are transferred from a dead solution into a vital fluid, such as the blood, they assume new forms; so that we must not always look *without* for the forms we find *within* the animal economy. The parasite of disease may exist in a pond or in moist ground in a very different form to what we find it in the blood. Therefore, from analogy, I *assume* that the parasite of Surra has its original normal development in moist ground, stagnant ponds, or slow running streams; and I further assume that it exists in such places in a different form to what it does in the blood. For while I readily succeeded in propagating it by transference to living, healthy blood, I have in two experiments failed to develop it by transferring it with a little blood into well-water, or into infusion of hay. The next fact is this: the spores and ova of a great many of these low organisms survive for an indefinite period in the dry state, in which state they may be conveyed by wind and other agents to distant places, where they will develop under favourable conditions of moisture and heat. In wet seasons they remain localised to a greater extent than in dry, hot seasons, for they cannot be blown about; but those scattered in a dry year may remain in dry places all over the country until the rain of the following year develops them, and then people often think the rain brought the pest, whereas the germs were brought under very different conditions many months before. If the Surra parasite, in some form or other, develops in ponds which dry up during the hot season, the germs or ova would be widely scattered by the wind which raises the dust of the beds of those ponds afterwards; the spores or ova would be sown broadcast; many would rest on the food, others in the

drink of horses, and thus they would be conveyed into the stomach; while others would be inhaled into the lungs, and develop by the moisture and heat there, then pass into the circulation. Possibly that may in some measure account for the disease prevailing much more this year and the last, which were very dry and hot, than the previous year (1878), which I was told was a very wet one in the district of Dera Ismail Khan. If, again, the horses daily drank water from a source in which these organisms naturally developed themselves, that would be the most common way in which they were conveyed into the system, and that water would be the chief remote cause of the disease. My opinion is that such is the case in the district of Dera Ismail Khan. I cannot prove it, for I have not been able to find the parasite in the water; but I declare that the water which the horses drink is very impure, and obtained from shallow, narrow, winding irrigation channels, choked with sedgy vegetation and slime, most favourable places for the breeding of all kinds of low organisms. For a further description of them I beg to refer to Appendix K. That the water is of a marshy character is further shown by the presence of flukes in the liver of two Surra cases I made a *post-mortem* examination of.

With regard to the food being the remote cause, it has been suggested that the disease is due to the horses eating grass from low inundated land on the bank of the Indus, etc. Major Money, 4th Punjab Cavalry, informed me that the disease was common among the horses of the 3rd Punjab Cavalry, when they got grass from inundated ground near the Indus, but it ceased when they received grass from higher ground. It is not improbable that such grass would convey the ova of the parasite; but it is not the common cause at the outposts, as the disease appears when the horses feed on chopped straw, and drink irrigation water at the base of the hills, forty miles beyond the reach of the Indus, just as much as when they feed on grass. And the disease prevails, moreover, at these posts far more than at Dera Ismail Khan, close to the Indus, where they get better water from wells.

I cannot speak favourably of the horse-standings at all the posts. Some of them were very much soiled, but upon the whole

they were not worse than the average of native cavalry, and I do not think the disease arises from this source. However, I would strongly recommend that the standings be raised and kept even, and the soil renewed periodically. There was an abundance of clean dry earth and sand near all the posts, but I saw none used to put on the ground when horses stale, to keep the stalls dry and clean, as is the practice in all well-regulated stables and horse-lines in India.

C. *Ultimate Causes.*—These are still more obscure. They comprise all those atmospheric and other conditions which favour the development of low organisms, the "Blight" upon vegetables, and epidemic disease (Cholera, etc.) among men. I have already referred to the manner in which germs are scattered more in dry seasons than in wet. The more dust there is blown about, the more broadcast are the spores and ova of low organisms sown; but the seeds of disease are not so plentiful as to be scattered as much at one dry season as another. No doubt, electrical conditions play a very important part, and very probably the conditions of the "spots" upon the sun also, as ultimate factors in the causation of disease germs. There is no doubt that Surra, though enzoötic, as a rule, in certain districts, does become epizoötic in some years; as the Tehsildar of Tonk informed me that about twenty years ago his uncle, the late Nawab, lost every one of his horses from Surra—about 300 in number—and that the disease was not very common since then until last year, though the sanitary conditions of the water, etc., remained the same. With regard to the influence of the different seasons of the year, I failed to obtain accurate statistics, as many horses of the 4th Punjab Cavalry have died with no record to show when they were first reported sick. But there is abundant evidence to show that the outbreak takes place usually in August, and more in September, continues until January, then suddenly ceases.

Prevention.—The important practical question is, If the cause of the disease does originate from the water, can we so alter its quality that the parasite will not breed in it when the most favourable ultimate or atmospherical causes prevail, as in epizoötic years? It would be impracticable to recommend all the

irrigation channels to be made "puckha," and kept clean; yet if my opinion, as expressed above, is correct, nothing short of that would do. But the water could be corrected by boiling it every day before the horses drink it, which would be a very expensive process in a district where fuel is so scarce. I do not know what else to recommend, unless good water can be got, at reasonable cost, by artesian wells, from below the salt strata; or pipes be laid down to draw water direct to the posts from the rivers, above where they are broken up to supply the irrigation channels: the pipes need not be large. It is simply a matter of expenditure, with regard to the average annual loss of horses from this disease, and the correctness of my opinion as to the causes of it. I wish much that I were able to advise upon this subject with less hesitation. There can be no doubt that the water is very bad, but whether it has any direct relation to Surra, as a remote cause, has not been proved, and perhaps cannot be proved without an expensive experiment as above recommended.

Cure.—I am very sorry to add that I have less hopes of finding a cure for the disease than I have of finding a preventive. The experiments I have made with carbolic acid do not promise success. Besides case 4, recorded in Appendix D, the following horses were selected for treatment exactly in the same manner; namely, 4th Punjab Cavalry, Nos. 1,169, 939, and 1,235. I selected them because, though they suffered undoubtedly from Surra, having the blood parasite, etc., they were mild cases, had been about three weeks on the sick list; there had been no dropsical swellings; they fed well, and did not look ill in any way to an ordinary or casual observer; they seemed in good spirits, and were in good condition. They had been placed upon the sick list only because the mucous membranes were yellow, with petechiæ, which the salootri had discovered in the course of his inspections. No medicine had hitherto been given, for I had requested, before I went to Dera Ismail Khan, that the cases submitted to me should not be complicated by the action of medicine, as I wished to study the disease in its natural course. I tried carbolic acid in these cases, because it has been recommended for parasitic blood diseases, though I have no confidence whatever in it for such cases. I think the blood, impregnated enough

with it to kill the parasites and their germs or ova, would be fatal to the patient also. The few cases recorded of recovery after its use in Anthrax have not, I believe, been assisted by it. However, I thought it was my duty to give it a trial in this disease, as I could not suggest anything better. A memorandum from the officer commanding, dated the 3rd inst., reports as follows:—Out of the four horses treated with carbolic acid and glycerine, two have died: No. 337 (case 4, Appendix D) died on 29th October, and No. 1,669 died 31st October. The two horses remaining under treatment are daily becoming thinner and weaker, and no benefit appears to be derived.

The Parasite.—I made the following notes when observing it at Dera Ismail Khan, with Swift's best lenses—$\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{12}$ (immersion). The $\frac{1}{8}$ is the best lens to see its movements and operations: the higher powers should not be used until it becomes quiet. In order to see all its operations, it is better to examine it in the serum after the blood has coagulated, or in defibrinated blood, and not to put too little on the slide, or else the blood dries up quickly, and the parasite will wriggle while he can, to get out; but he will not attach himself to the corpuscles in the manner I shall presently describe. Put a fair drop of fresh serum on the slide; lay the thin cover on; press it *moderately*, so as to squeeze some of the blood from under the cover all round; retain the pressure a short time, until what has been so pressed out coagulates or dries up, and forms a good temporary cement which will keep the serum within from drying. The movements of the parasite can then be watched for many hours. If it be required to see it at rest, then a very thin layer of blood should be put on the slide, and allowed to thicken a little before covering it. The shape of the parasite, however, will be found to differ at rest, if the blood thickens soon, from what it is if the serum be kept fluid long, and the parasite die slowly. In the latter case the body spreads out and flattens; in the former it remains contracted.

When I first saw it I thought for a moment it was some form of spirillum, but the next instant convinced me it was not.

Shape.—It has an apparently round body, when it is fresh and active, which tapers in front to a neck ending in a blunt head,

and behind it has a tapering tail from which there extends a long slender lash, so fine that it can seldom be seen. Its outline can be made out sometimes for an instant when its motion in the serum refracts light, but its presence may be inferred from seeing the corpuscles quivering at a distance from the visible part of the tail. Sometimes the head appears a very little thicker than the neck; but, as a rule, I failed to see any difference, and sometimes I thought it looked smaller. Probably its size is not always the same relatively. In one or two instances, one particularly, when the body was sunk in the serum, and the head facing towards the covering glass, I saw what appeared like a circlet of short hair-like pseudopods. I only saw it for a few seconds, as the head sank out of focus, and I was not able to make a reliable observation; but I mention it in order that my impression may be corrected or confirmed by future observers. When it dies slowly in serum, its body flattens out. After many hours of watching it closely in all its changes of form and movements, I came to the conclusion that it has two fin-like papillæ on each side, one near where the neck commences, and another near where the tail begins. In only very few instances was I able to see the four at once; but whether I saw one, two, or three, they were always in the same relative positions. Sometimes they could be seen projecting from the body; at other times they were seen as refracting spots on the body. Perhaps they are pseudopods also.

Motion.—Undulatory, eel-like, and as a rule wonderfully active. The body alters its shape in its movements, shortening and thickening, lengthening and becoming more slender, so that it is most difficult to estimate its real size. Its progress is almost always in the direction of the blunt end, which I therefore called the head; though it goes in the reverse direction sometimes, when pulling at a corpuscle.

Size.—Its *visible* length ordinarily appears on the average to be about three or four times the diameter of a white corpuscle, and the average diameter of its body about one-eighth or one-tenth that of a white corpuscle. That is how it appeared to me and others, but I had no micrometer to measure it with. There is much of its tail end that is not ordinarily visible.

Colour.—White, like a spermatozoon.

Actions.—It has a wonderful elective affinity for the red corpuscles, but none for the white, as seen when there are many of the latter in the field. At a certain stage of its development it is constantly worrying the red corpuscles. The first exclamation made by every one who saw the parasites at that stage was to this effect: "Oh, the little villains! see how ferociously they attack the red corpuscles!" Dr. Haig remarked that, whatever family it belongs to, its most appropriate specific designation is *Ferox*. I mention this because, to one who sees them for the first time in this stage, the *apparent* ferocity is a most impressive and distinguishing characteristic. They always fasten to the red corpuscles by their blunt end, never by any other part; so it is not an accidental attachment. They look as if they went to the corpuscle for a definite purpose, fasten to it, and shake it about in the serum in a very wonderful manner. I have often seen two fasten to one corpuscle, pull it out of shape, and one of them would break a particle off, then go about with the fragment, which made it look something like a bull-headed spermatozoon. On one occasion I saw four of them fasten on one corpuscle, and pull in contrary directions for some time, until they broke it up. When they thus fasten to a corpuscle they seem to tug hard at it, and then they lash their tails with unusual rapidity. I have seen them pull a corpuscle right across the field, and one I saw doing so *backwards* a considerable distance *against the stream* when the stage was inclined; but as a rule they move forwards. Sometimes, when they go off with a fragment of corpuscle, they wriggle in all manner of vermicular contortions, as if they wished to get rid of it. When the corpuscles are in *rouleaux*, the parasites crawl over them and seem to try to push between them: in this way they often separate the end corpuscles of the *rouleau* from the others. They show a great preference for the concave side of the disc, rather than the edge. What their object is in fastening to the corpuscles, I cannot tell; but it is strongly suggestive of sucking. I have frequently seen one of them suddenly turn aside towards another, and, I sometimes thought, bring him to by whipping his tail round him, and then fasten to him lengthwise; after that both would wriggle about very actively

together, and look like one long body. I have not been able, owing to their rapid motions, to assure myself in what manner they unite. I am inclined to think that their heads and tails are in the same direction, and over-lapping each other; but Dr. Haig was inclined to think, on the contrary, that they fasten with their tails in opposite directions. What they do it for I do not know, perhaps for copulation; but a combatant officer on one occasion, looking at a fresh drop of blood, and seeing the parasites unite in that manner, exclaimed, "By gad! now two of the little devils are fighting for a piece of corpuscle which one of them had broken off." I mention this because that officer had not been told before that they did sometimes fasten together; so that he was not in that state of mind called "expectant attention." He said afterwards that "he had observed a small particle of corpuscle at the head of one of the two before the other rushed up to tackle him."

With reference to the Surra parasites, which I transferred from the horse to the dog (*vide* Appendix I.), and which I submitted to Dr. Lewis for his opinion as to what they are, I received the following communication from him on the 8th instant:—"They appear to be very closely allied to the flagellated parasites which were detected by myself in a considerable number of apparently healthy rats during 1878, and which were described shortly afterwards in a report on Micro-organisms in the Blood, published in this office Annual Report for 1877. I have not been able to examine the organisms which you have found with sufficient care as yet to venture to express an opinion as to whether or not they are specifically identical with those found in the blood of rats; but as you have been so kind as to make over the puppy to me, I shall take an early opportunity of comparative examinations of them."

Dr. Lewis went to Calcutta for winter duties on the day I received the above, and I have written to tell him, that if he can find a rat with these organisms in its blood (I believe he found many of them at Calcutta), I will inoculate a pony with it, to see whether Surra can thus be produced.

Appendix A.

Case 1.—*Bay Mare. Aged* 19. *Regimental No.* 298.

September 19*th*, 1880.—*Previous History.*—This mare went to Draband outpost on the 29th November, 1879. Returned to head-quarters, Dera Ismail Khan, 28th February, 1880. On the 1st April went to Tonk outpost, and remained there until the 30th May, 1880. Returned to Dera Ismail Khan 10th June, 1880, and was admitted on the sick report for Surra, 21st August, with the following symptoms (related by the salootri) :—"Sluggish gait; small appetite for grain, but ate grass with relish; great thirst; urine normal in colour, but increased in quantity; some reddish substance visible on the dung, with unpleasant odour; visible mucous membranes yellowish; dark red spots on the inner side of eyelids; slight swelling of the legs; respirations increased."

The treatment adopted was as follows :—"Take of Cinchona Bark, four drachms; Spirit Nitre, one ounce; Sulphuric Acid, diluted, one drachm; Water, twelve ounces. Mix. One-ninth part to be given three times daily. This did not appear to do good, and the following was tried :—Take of Tincture of Iron per chloride, four drachms; Chiratta Powder, four drachms; Water, twelve ounces. Mix. One-fourth part to be given twice daily. When the breathing was heavy, two drachms of Carbonate of Ammonia were given in a pint of water."

Present Symptoms. Morning.—Pulse 54, soft and very thrilling; respirations 30, short and irregular; auscultation and percussion sounds normal; temperature within the rectum 100°; tongue pale and moist; eyes watery, with claret-coloured petechiæ on the conjunctiva, principally on the membrana nictitans; all visible mucous membranes of a pale yellow colour; very thirsty; feeding fairly well, taking six pounds of grain daily, and the full allowance of grass; skin dry and bound to the ribs; the gait stiff and weak; œdema of all the legs. Urine and dung not shown. In a few minutes after I had made the above notes, just as I was coming away, she showed symptoms of abdominal pain, became restless, lying down and soon up again, etc., which the

salootri said was a sure sign that she would not live long, for it was not uncommon for the cases to have such restlessness off and on in the latter stage and increasing up to the end. This is the first time this mare has shown pain. *Evening.*—Has had no pain since noon. Pulse 56; respirations 36; temperature 101⅗°; urine alkaline, specific gravity 30, there is no trace of albumen, colour normal; dung normal; fed up. Examined the blood under microscope, the light not good; found nothing abnormal.

September 20th. Morning.—Pulse 50; respirations 14, short; temperature 100⅕°; urine specific gravity 35, alkaline, free from albumen, sediment normal. *Evening.*—Pulse 52; respirations 28; temperature 101⅗°; urine specific gravity 26; dung normal; feeding well.

September 21st. Morning.—Pulse 46; respirations 9, not so short as usual; temperature 100°; urine specific gravity 35, alkaline, free from albumen; dung normal. *Evening.*—Pulse 35; respirations 30; temperature 102°; urine specific gravity 34; fed up.

September 22nd. Morning.—Pulse 56; respirations 12; temperature 101½°; urine specific gravity 18. Blood examined for the first time in good light by the microscope; parasites found in great numbers, exceedingly active. I shall give a fuller account of them elsewhere. *Evening.*—Pulse 68; respirations 40; temperature 103⅖°; urine specific gravity 30; fed up during the day.

September 23rd. Morning.—Pulse 58; respirations 14; temperature 101°; urine specific gravity 30, has no albumen. Parasites continue active in the blood. *Evening.*—Pulse 90; respirations 68; temperature 105⅕°; urine specific gravity 22; fed well during the day.

September 24th. Morning.—Pulse 68; respirations 18; temperature 102⅖°; urine specific gravity 20, more high-coloured, slightly albuminous, alkaline. Parasites in blood less active and fewer. *Evening.*—Pulse 64; respirations 48; temperature 102⅖°; urine specific gravity 22, not so high-coloured as in the morning; fed well.

September 25th. Morning.—Pulse 49; respirations 12, laboured; temperature 100°; urine specific gravity 28, alkaline, slightly albu-

minous. Examined a drop of fresh-drawn blood carefully, found only one parasite, which appeared thicker in the body than what I saw before; examined a second drop, and found no parasite in it; examined a third drop, got from another fresh cut, and found no parasite. The white corpuscles are much increased in number. *Evening.*—Pulse 58; respirations 42; temperature 102°; urine specific gravity 30; fed well during the day.

September 26th. Morning.—Pulse 50; respirations 10; temperature 100°; urine specific gravity 30, alkaline, free from albumen. *Evening.*—Pulse 66; respirations 45; temperature 102°; urine specific gravity 22.

September 27th. Morning.—The animal is greatly emaciated, though she feeds so well, and there is no chance of her recovery. She was therefore destroyed, in order to investigate the disease *post-mortem.* Large quantity of clear serum found in the abdominal cavity, and a slight velvety fluff of lymph upon the parietal peritoneum. No inflammation. Subperitoneal connective tissue very yellow. Liver impregnated throughout with old calcareous degenerations of cysticerci larvæ from the size of a pea down. The organ was otherwise perfectly healthy in structure. The stomach and intestines were opened, and examined from end to end, and found normal. There were a few subperitoneal petechiæ on the free border of the small colon; these were examined by the microscope; nothing but a sanguineous exudate was found. Scrapings and sections of the kidneys were examined by the microscope; nothing abnormal was found in them. Spleen, heart, and lungs were also healthy. Parasites found in the blood, but not nearly so many as at first.

Remarks.—It is worthy of note in this case that the urine became slightly albuminous with the disappearance of the parasites from the blood. I found nothing abnormal in the deposit from the urine, examined carefully for "casts" of the urinary tubules of the kidney. Dung was always normal. The patient showed no symptom of pain since the morning of the 19th. The great difference observed between the number of respirations morning and evening I attribute to the heat of the sun, which came direct upon the horses in the afternoon. The temperature within a cool bungalow was about 82° every day.

Appendix A.

Table showing the Variations in the Pulse, Temperature, Urine, and Blood of Case 1.

Date. 1880.	Morning or Evening	Pulse.	Temperature of Rectum.	Urine.		Blood, etc.
				Sp. Gr.	Albumen	
Sept. 19.	M.	54	100	—	—	
„ 19.	E.	56	101½	·30	Abst.	
„ 20.	M.	50	100½	·35	„	
„ 20.	E.	52	101½	·26	„	
„ 21.	M.	46	100	·35	„	
„ 21.	E.	35	102	·34	„	
„ 22.	M.	56	101½	·18	„	Many parasites in blood. First examination with good light.
„ 22.	E.	68	103½	·30	„	
„ 23.	M.	58	101	·30	„	Ditto.
„ 23.	E.	90	105	·22	„	
„ 24.	M.	68	102	·20	Little.	Fewer, and less active.
„ 24.	E.	64	102½	·22	—	
„ 25.	M.	49	100	·28	Little.	Only one found in three drops of blood. White corpuscles much increased in number.
„ 25.	E.	68	102	·30	—	
„ 26.	M.	50	100	·30	Abst.	No examination.
„ 26.	E.	66	102	·22	—	
„ 27.	M.		Destroyed.			Parasites found in the blood, but not nearly so many as on the 22nd.

Note.—The abnormal increase of temperature and pulse in the evening.

Appendix B.

Case 2.—Dun Gelding. Aged 8.

September 19th, 1880.—*Previous History.*—This is a large-sized "pony," belonging to a grass-cutter. Was at Jutta outpost from 4th September, 1879, to 30th January, 1880, and at Tonk outpost from 1st February until 19th August last. Was first reported sick of Surra on the 13th instant, with the following symptoms (as described by the salootri):—"Feverish heat of body; eyes rather yellow, with red spots on the lids; nostrils rather stuffed up with mucus; breathing quick; urine excessive, of normal colour at first, becoming red on the third day; thirst

excessive; swelling of the legs and abdomen. No medicine given."

Present Symptoms. Morning.—Pulse 50, soft, having no thrill like that of case 1; respirations 10, regular and with normal sounds; temperature 103°; eyes very heavy, expression watery, œdema of conjunctiva, claret-coloured petechiæ on the membrana nictitans; the visible mucous membranes generally of a dirty yellow colour; mucous discharge from the nose; mouth moist; much œdema of the sheath, belly, and legs; gait weak and stiff; eats 4 lbs. corn daily, with a full allowance of grass; very thirsty; in low condition. *Evening.*—Pulse 56; respirations 40; temperature 105⅘°; urine specific gravity 28, alkaline and albuminous, of a reddish colour; dung normal.

September 20th. Morning.—Pulse 47; respirations 8; temperature 102⅘°; œdema of sheath and abdomen increased; urine specific gravity 32, alkaline and albuminous; deposit from yesterday's urine shows no casts or anything abnormal. *Evening.*—Pulse 64; respirations 46; temperature 106⅘°; urine specific gravity 26, alkaline and albuminous; feeding.

September 21st. Morning.—Pulse 46; respirations 9; temperature 102°; urines pecific gravity 30, alkaline, albuminous, and reddish in colour. *Evening.*—Pulse 50; respirations 40; temperature 105⅘°; urine specific gravity 22, alkaline, albuminous, and reddish; fed up 5 lbs. of grain, with full allowance of grass; œdema increased everywhere, and the petechiæ more marked.

September 22nd. Morning.—Pulse 46; respirations 9; temperature 103°; urine specific gravity 28, alkaline and albuminous. Blood examined by microscope, and parasites found in great numbers, same as in case 1; white corpuscles much increased in number. *Evening.*—Pulse 53; respirations 48; temperature 104°; urine specific gravity 20, alkaline and albuminous; œdema increasing.

September 23rd. Morning.—Pulse 50; respirations 11; temperature 104°; urine specific gravity 30, alkaline and albuminous; swelling of the glands near side of the jaw; very tender, so that the artery cannot be felt on that side. *Evening.*—Pulse 52; respirations 52; temperature 104°; looks more dejected; the eyes discharge mucus; the petechiæ are more diffused, and not so

claret-coloured, but more of a dirty brick-red colour; feeds as usual.

September 24th. Morning.—Pulse 40; respirations 11; temperature 100° (observation repeated); urine light colour, specific gravity 22, more alkaline and less albuminous, contains a larger amount of phosphates; swelling of the gland increasing and very tender. *Evening.*—Pulse 58; respirations 50; temperature 104°; urine specific gravity 30, alkaline and albuminous; mouth keeps moist, and the animal feeds as usual; drinks much; becoming wretchedly thin.

September 25th. Morning.—Pulse 45; respirations 10; temperature 100⅔°. Examined a fresh drop of blood, could find only two parasites on the slide, but there is a further increase in the number of white corpuscles, and a large quantity of granular matter in the serum, also a great number of small shapeless particles of red corpuscles, from half the size of a healthy corpuscle downwards; examined another drop of fresh blood, and could find only one parasite; examined a third drop, and failed to find one. Urine specific gravity 28, alkaline, albuminous, colour normal. Lay down last night for the first time since he came into the sick lines, was down for three or four hours; showed no pain; œdema less this morning. *Evening.*—Pulse 52; respirations 50; temperature 103⅔°; urine specific gravity 32, alkaline, albuminous.

September 26th. Morning.—Pulse 45, smaller and weaker; respirations 11; temperature 100¼°; urine specific gravity 31, more alkaline, but has less albumen, colour normal; œdema is still less than yesterday. *Evening.*—Pulse 56; respirations 48; temperature 104°; urine specific gravity 36, high coloured, alkaline and albuminous; feeding better; œdema subsiding.

September 27th. Morning.—Pulse 46; respirations 14; temperature 100°; no urine kept. *Evening.*—Pulse 64; respirations 54; temperature 105°; urine specific gravity 32, high coloured, albuminous, and alkaline; fed up.

September 28th. Morning.—Pulse 48; respirations 12; temperature 101⅔°; urine lost; refusing food. *Evening.*—Pulse 68; respirations 54; temperature 106°; urine very high coloured, and contains much albumen; abscess under the jaw.

September 29th. Morning.—Pulse 44; respirations 9; temperature 100⅘°; urine specific gravity 24, high coloured, alkaline, albuminous. One drop of blood examined, and only one parasite found, which was very active.

September 30th. Morning.—Destroyed for *post-mortem* examination. A large quantity of clear fluid found in the abdominal cavity, with a slight velvety fluff of lymph on the parietal peritoneum, less than in case 1; no inflammation. *Filaria Papilosa* found on the mesentery. Stomach and intestines opened throughout, and found normal, except a number of submucous petechiæ on the small intestines and small colon, which I found under the microscope to be a simple sanguineous exudate like the petechiæ of the conjunctiva, and what I also found common in the vagina of mares suffering from this disease. They had no relation whatever to the intestinal glands. The kidneys, liver, spleen, lungs, and heart were found healthy. Parasites in the blood, but not so many as on the 22nd.

Remarks.—Note that in this case albumen was found in the urine throughout, and it appeared to have no relation with the disappearance of the parasite from the blood, as case 1 led one to suppose. The structure of the kidney was perfectly normal under the microscope, and I found no casts in the urine. The structure of the liver was also perfectly normal, though all the mucous membranes were tinged with the yellow colour of bile. I examined these organs with great care in this case, as well as in case 1, directly after death. The weather was exceedingly hot, but I had plenty of ice in large felted baskets, to preserve the organs without any *post-mortem* changes until I examined them. (That is, while I was examining one organ the others remained in ice.) The increased number of the respirations in the evening, compared with the morning, was as remarkable in this as in case 1, and in all other cases I observed, and was due, I have no doubt, to the effect of the exposure to the hot sun. I examined the dung carefully morning and evening, for worms, etc., and found nothing abnormal. With regard to the swelling of the submaxillary glands and discharge of mucus from the nose, I found this in four cases only out of fifty.

APPENDIX B.

Table showing the Variations in the Pulse, Temperature, Urine, and Blood of Case 2.

Date. 1880.	Morning or Evening	Pulse.	Temperature of Rectum.	Urine.		Blood, etc.
				Sp. Gr.	Albumen	
Sept. 19.	M.	50	103	—	—	
„ 19.	E.	56	105$\frac{2}{5}$	·28	Prsnt.	
„ 20.	M.	47	102$\frac{2}{5}$	·32	„	
„ 20.	E.	64	106$\frac{1}{4}$	·26	„	
„ 21.	M.	46	102	·30	„	
„ 21.	E.	50	105$\frac{3}{5}$	·22	„	
„ 22.	M.	46	103	·28	„	First examination of blood with good light. Many parasites present. White corpuscles abnormally increased in number.
„ 22.	E.	53	104$\frac{4}{5}$	·20	„	
„ 23.	M.	50	104	·30	„	Blood not examined.
„ 23.	E.	52	104	—	—	Ditto.
„ 24.	M.	40	100	·22	Prsnt.	Ditto.
„ 24.	E.	58	104	·30	„	Ditto.
„ 25.	M.	45	100$\frac{3}{5}$	·28	„	Only two parasites found. White corpuscles continue increased in number, with much granular matter, and red particles in the serum.
„ 25.	E.	52	103$\frac{2}{5}$	·32	„	
„ 26.	M.	45	100$\frac{4}{5}$	·31	„	Blood not examined.
„ 26.	E.	56	104	·36	„	Ditto.
„ 27.	M.	46	100$\frac{3}{5}$	—	—	Ditto.
„ 27.	E.	64	105$\frac{1}{5}$	·32	Prsnt.	Ditto.
„ 28.	M.	48	101$\frac{2}{5}$	—	—	Ditto.
„ 28.	E.	68	106$\frac{1}{5}$	—	Prsnt.	Ditto.
„ 29.	M.	44	100$\frac{3}{5}$	·24	„	Only one parasite found. It was active.
„ 30.	M.		Destroyed.			Parasites found in the blood, but not so many as on the 22nd.

Note.—The abnormal increase of temperature and pulse in the evening.

APPENDIX C.

Case 3. *Regimental No.* 866. *Brown Mare. Aged* 9.

September 25th, 1880. *Evening.*—This mare was brought to the sick lines when I was examining the other cases, and I was told she was only just reported as suffering from the first symp-

toms of Surra. Her history was that on the 8th March last she went to Khuttee, about fifteen miles from Dera Ismail Khan, and returned to head-quarters on the 29th April. On the 5th May she went to Tonk outpost, on the 5th June to Zam outpost, on the 15th August returned to Tonk, and on the 2nd instant she returned to head-quarters, Dera Ismail Khan.

Present Symptoms.—Pulse 58; respirations 36; temperature 105°; urine not shown. Blood not examined, because my eyes were already overworked, and the glare from the sun was great. Conjunctiva œdematous, with several small petechiæ; lachrymation excessive; all visible mucous membranes yellow, the vagina especially so, in which also were many deep-coloured petechiæ; mouth dry, with great thirst; slight œdema of legs; gait weak and stiff; eats nothing. The general condition is very fair, as fat as any working horse should be, but not plethoric.

September 26th. Morning.—Pulse 50; respirations 11; temperature 101⅘°. Parasites found swarming in the blood, and very active; white corpuscles in great numbers, a large increase in the number of the very granular white corpuscles. Refuses grain, eats a little grass; is very thirsty. Œdema of hind legs increased since yesterday; mouth moist (before any drink was given); urine specific gravity 50, alkaline, has no albumen, colour normal; dung normal. *Evening.*—Pulse 66; respirations 38; temperature 106°; urine specific gravity 41, normal colour, free from albumen. Eats grass freely, refuses grain.

September 27th. Morning.—Pulse 60; respirations 10; temperature 104°. No urine kept. Refuses grain, eats grass, is very thirsty. The dirty yellow colour and petechiæ, which are characteristic in the conjunctiva of this disease, are also very marked in the mucous membrane of the vagina of this mare. *Evening.*—Pulse 62; respirations 30; temperature 105°; urine specific gravity 40, no albumen, alkaline, colour normal. Refuses grain, eats grass slowly; does not lie down. I am told that the patients suffering from this disease seldom do lie down night or day.

September 28th. Morning.—Pulse 49; respirations 8; temperature 101½°; œdema at the sternum; off feed; thirsty,

mouth moist; urine alkaline, and contains much albumen, specific gravity 38, high-coloured. *Evening.*—Pulse 62; respirations 16; temperature 104¼°; œdema at the sternum increased; urine specific gravity 26, albuminous, less colour.

September 29th. Morning.—Pulse 50; respirations 10; temperature 100⅜°; urine specific gravity 34, albuminous, alkaline, colour normal. No parasite found in a drop of blood taken from the off side of the neck, but one very active found in a drop taken from the near side. Œdema extending backwards from sternum. Patient was down for two hours last night, showed no pain. *Evening.*—Pulse 56; respirations 32; temperature 103⅗°. Fed up six pounds of grain and full allowance of grass.

September 30th. Morning.—Pulse 60; respirations 12; temperature 101°; œdema increasing, feeding. Urine not examined. No evening examination was made. I was too busy in making a *post-mortem* examination and inspecting horses coming in from the outposts.

October 1st. Morning.—Pulse 54; respirations 14; temperature 101⅜°; urine specific gravity 32, albuminous and alkaline. Fed up yesterday eight pounds of grain and grass. *Evening.*—Examination not made, too busy otherwise.

October 2nd. Morning.—Pulse 60; respirations 14; temperature 104⅕°; œdema increasing; urine specific gravity 32, alkaline, albuminous. Fed six pounds of grain yesterday, besides the grass. She has fallen off in condition wonderfully.

October 3rd. Morning.—Pulse 58; respirations 18; temperature 102⅖°. Urine not examined.

October 4th. Morning.—Pulse 62; respirations 14; temperature 103°. Fed up eight pounds corn yesterday, besides the grass. One drop of blood examined, only one parasite found.

October 5th. Morning.—Pulse 64; respirations 14; temperature 103°. Fed up yesterday nearly eight pounds grain. Submaxillary glands very tender and enlarged.

October 6th. Morning.—Pulse 65; respirations 20; temperature 102⅘°. Submaxillary glands more enlarged and very tender; the pulse has to be felt at the heart. Passing urine frequently, colour light (not able to examine it further). Œdema of hind legs increasing.

October 7th. Morning.—Pulse 66; respirations 13; temperature 102$\frac{1}{5}$°. A great number of parasites found in a drop of blood. Fed only four pounds of grain yesterday; is wasting to a skeleton.

October 8th. Morning.—Pulse 60; respirations 22; temperature 103$\frac{2}{5}$°. Refused grain yesterday, ate grass.

October 9th. Morning.—Pulse 50; respirations 18; temperature 100$\frac{2}{5}$°. Ate only one pound of grain yesterday, and half allowance of grass.

October 16th. Morning.—I returned last night from the outposts, and find this mare reduced to a wretched "bag of bones," though I am told that for the last three or four days she has eaten eight pounds of grain daily, with the full allowance of grass, Pulse 58; respirations 10; temperature 100$\frac{2}{5}$°. Œdema has disappeared from the body and fore legs, but continues in the hind legs. One drop of blood examined, no parasite found. The white corpuscles are in great numbers. Many of the red corpuscles, smaller than normal, look like particles of shapeless jelly. There is much granular matter in the serum.

October 18th. Morning.—Destroyed for *post-mortem* examination. Very little serum found in the abdominal cavity. There was a slight velvety fluff of lymph on the parietal peritoneum. No inflammation. The kidneys were pale and sodden-like. Had no time to make a section of these kidneys for microscopic examination. The liver, spleen, heart, and lungs were healthy. The stomach and intestines were opened from end to end, and found healthy. A few parasites were found in the blood.

Remarks.—It should be particularly noted in this case, with regard to the life-history of the blood parasites, that they do not disappear from the blood absolutely when it becomes difficult to find one in a drop of blood, but that when one brood or generation dies there are ova or spores left for the development of another brood. Thus in this case, on the 26th September, the parasites were swarming in each drop of blood. On the 29th only one parasite was found in two drops of blood examined. On the 4th October one parasite only was found in one drop of blood. On the 7th October a great number were found in a drop (that is, there were more than I could count). I was not

able to see the case again from the 9th ultimo to the 16th, when one drop of blood was examined, and no parasite found. It should be noted also that this patient was much more off her feed than is usual in this disease. This is the only case in which the structure of the kidney did not appear perfectly healthy; I therefore consider it was a coincidence, or what might be called an accidental occurrence in the case, and having no special relation with the disease.

APPENDIX C.

Table showing the Variations in the Pulse, Temperature, Urine, and Blood of Case 3.

Date. 1880.	Morning or Evening	Pulse.	Temperature of Rectum.	Urine.		Blood, etc.
				Sp. Gr.	Albumen	
Sept. 25.	E.	58	105	—	—	Blood not examined.
„ 26.	M.	50	101¼	·50	Abst.	Parasites in blood swarming. White corpuscles in great numbers.
„ 26.	E.	66	106	·41	„	
„ 27.	M.	60	104	—	—	Blood not examined.
„ 27.	E.	62	105	·40	Abst.	Ditto.
„ 28.	M.	49	101¼	·38	Prsnt.	Ditto.
„ 28.	E.	62	104⅛	·26	„	Ditto.
„ 29.	M.	50	100⅝	·34	„	Only one parasite found.
„ 29.	E.	56	103⅜	—	—	Blood not examined.
„ 30.	M.	60	101	—	—	Ditto.
Oct. 1.	M.	54	101⅜	·32	Prsnt.	Ditto.
„ 2.	M.	60	104½	·32	„	Ditto.
„ 3.	M.	58	102⅝	—	—	Ditto.
„ 4.	M.	62	103	—	—	Only one parasite found in the blood.
„ 5.	M.	64	103	—	—	Blood not examined.
„ 6.	M.	65	102	—	—	Ditto.
„ 7.	M.	66	102⅛	—	—	A great many parasites in drop of blood.
„ 8.	M.	60	103⅜	—	—	Blood not examined.
„ 9.	M.	50	100⅝	—	—	Ditto.
„ 16.	M.	58	100⅜	—	—	No parasite found. White corpuscles continue in great number. Many of the red corpuscles smaller in size than normal. More particles. Much granular matter in the serum.
„ 18.	M.		Destroyed.			Few parasites found in the blood.

Note.—The abnormal increase of temperature in the evening.

(To be continued.)

CHRONIC INDIGESTION, DUE TO ULCERATION OF THE STOMACH.

BY J. B. WOLSTENHOLME, M.R.C.V.S., MANCHESTER.

I HAVE forwarded a portion of the stomach of an aged cart-horse for inspection. I had known him for some twelve or eighteen months, and have frequently attended him, he being the subject of chronic indigestion, with irregular appetite, the bowels generally constipated, but very susceptible to purgatives. There was imperfect assimilation, for, though well fed and not overworked, he was always in poor condition. Decomposition of the fæces, on defecation, was much greater than usual, they being very offensive. On the morning of the 29th July, he appeared to be better than usual, and rather greedily ate his first meal. About four p.m. he was in dull pain, and defecated. This, with intervals of ease, continued until the same day in the following week, *i.e.*, August 5th, when, at the point of death, he was destroyed. During this time, with the exception of a little fæces removed with the first enema, nothing more was passed. There was no violent pain; the pulse for the first three days was normal, then it gradually went up 60—120—114, until it reached 132 on the day of death. During this time aloes, Ol lini, enemas, and anodynes, with diluents, and warm fomentations were administered. There was no injection of mucous membranes at first, but they became of a dark-red hue in the later stages. The tongue and mouth were very dry; the rectum was also dry, and quite void of mucus. On *post-mortem* inspection, we found the bowel empty from the rectum to the termination of large colon, but its lining membrane dry, and had small sordes attached. At the terminal portion of the large colon, the ingesta was of the consistence of moderately firm cow-dung, its outer portion being blood-stained through contact with the rather congested mucous membrane. The remainder of the ingesta was pultaceous; no solids in small intestines or stomach, and no inflammatory patches. The heart, when washed, weighed seven pounds, and was fatty; the liver was twenty-one pounds, of a brown clay-colour, very friable, and evidently having undergone considerable fatty degeneration. The stomach was thin

at the cuticular portion, and somewhat hyperæmic at the villous part, due possibly to cathartics; but that which drew my attention most was a chain of ulceration running along the cuticular portion, near to the commencing line of the villous moiety. On further examination, one sees a number of lemon-coloured spots, some a little elevated and peeling off, evidently to become a small ulcer; then on holding the viscus up to the light, a number of points, whiter and less translucent than their surroundings, may be seen. I shall be very pleased if you have time and can examine the same.

[The portion of a horse's stomach forwarded by Mr. Wolstenholme presented the following appearances:—Running parallel to the line of junction of the villous with the cuticular portion, and in the latter coat, was an irregular-shaped chain of ulceration about three inches in length, together with a number of erosions varying in size from a pin's head to that of a sixpenny-piece. The ulcerations forming the chain were somewhat deeper than the latter, and extended as deep as the muscular layer of the stomach. That portion of the cuticular mucous membrane in which they occurred was blanched, firm and thickened from the increased formation of connective tissue, and was more firmly attached to the submucous tissue beneath than the surrounding membrane. It likewise presented a number of cicatrices which, from contraction, had the effect of drawing it up into a variety of folds. From their form and arrangement the larger patch of ulceration appears to have resulted from the smaller ones having become confluent, and were probably caused by bots. Nothing abnormal was observed in the villous portion of the organ, which was coated by a thickish film of slimy mucus, the result perhaps of gastric catarrh.]

SERIOUS INJURIES TO A HORSE: RECOVERY.

BY C. GRESSWELL, M.R.C.V.S., NOTTINGHAM.

ON April 25th a bay six-year-old cart mare, in good condition, belonging to W. Collison, Esq., of Nottingham, in galloping away broke down the closed gates of a railway crossing, and

came in contact with a passing train going at the rate of about twenty-five miles an hour. On examination one hour afterwards, I found the following lesions :—A transverse fracture of the frontal bones throughout their whole breadth, two inches of the orbital process of the left frontal bone being detached. The malar ridge on the left side was broken transversely in two distinct parts. The inferior portion of the orbit, comprising the lachrymal bone, portions of the superior maxillary, and the malar, was fractured in many places, and portions detached. The inferior maxillary was broken at the neck, two inches below the joint, and the jaw consequently movable in any direction. On taking away portions of detached bone, the parietal was found to have a longitudinal fracture, causing a fissure one-eighth of an inch wide, through which the cerebral membranes were visible. The eye was of course invisible, and the jugular vein on the same side was ruptured, with, however, but slight injury to the skin. Pulse 24; temperature 99°. Great dulness and general depression, and animal rapidly becoming semi-comatose. A prognosis of Phrenitis and death, although turning out to be incorrect, was perhaps justifiable. Immediate treatment consisted in the administration of diffusible stimulants, mild dose of physic, thorough cleansing of wounds, with extraction of all loose pieces of bone. In four hours the pulse rose to 32, and temperature 100°. Constant irrigation of the whole head with hot water was then had recourse to, with experimental doses of Bromide of Potassium, ʒij every four hours.

The following day, April 26th, and up to the seventh day, this course was steadily persevered in. The general effect seemed to be to keep the mare in a constant state of quietude. On the third day the temperature rose to 103°, but by the aid of two doses of Sod. Salicyl. this was at once reduced. The pulse invariably stood at 26 to 30 during these seven days. No inflammation of the brain occurred, and the wound assumed a healthy suppurating character. The swelling, however, was very great. On the third day large portions of the frontal, and smaller portions of the inferior floor of the orbit were taken away. The frontal sinus was thus opened at the superior extremity, which opening admitted the entrance of three fingers. The temperature of the

water used for irrigation *was gradually reduced*, until nothing but cold water was applied. After the seventh day the Bromide was discontinued, and the pulse rose within thirty-six hours to 40, and temperature 100°. During the whole of the seven days the mare showed no inclination to drink anything, save about two pints a day of cold water. No gruel of any description could she be induced to drink; and of course eating was out of the question, on account of fracture of the jaw. She had administered to her, daily, from one to two pounds of finely chopped raw beef in the shape of balls. At the end of the seventh day she began slowly to take a little nourishment herself, in the form of thick oatmeal gruel, with chopped carrots; and gradually but surely she took different varieties of food, and in greater quantities. The meat balls were discontinued gradually. Cold water irrigation, with varied dressings of Acid Carb., Sol. Arg. Nit., Sol. Pot. Permang., Zinci Chlorid. Iodoform, effected a cure in five weeks from the date of the accident. On May 12th the frontal sinus was trephined, on account of an accumulation of pus, and several bone sloughs, belonging to the superior maxillary, extracted.

The principal interest connected with this case I take to be is the beneficial action of Bromide of Potassium in such large doses. The injuries were so extensive that inflammation of the brain seemed almost a certainty, and to the beneficial action of Pot. Bromid. must the success of the case be attributed. Constant irrigation with water, gradually lowered as to temperature, had likewise, I think, a splendid effect. Another point of interest lay in the beautiful union that took place in the lower jaw.

After this practical experience, I think it may safely be stated now that a horse may easily be kept alive, and that, too, with very little trouble, on minced flesh. This mare for seven days had literally nothing but meat, and for the next week very little in addition. The details of the treatment of the wound as to surgery, syringing, etc., were such as recommended themselves from day to day, the only point of interest being the bursting of the temporal artery on the sixth day, which caused considerable danger at the time, but which was happily soon overcome. The mare has now been at regular work since June 7th.

ABSCESS IN THE PELVIC CAVITY.

BY JAMES WEBB, M.R.C.V.S., BISHOP'S STORTFORD, LATE VETERINARY SURGEON IN THE ROYAL HORSE ARTILLERY.

In November of last year, C. Stacey, Esq., of Wickham Hall, in this neighbourhood, requested me to attend a roan cart gelding, four years old, that was seized with what he supposed to be something more than ordinary Colic, as the animal groaned and strained very violently.

When I arrived I found the patient rolling about and groaning; and upon rising, straining as if to defecate, but ineffectually. After administering a hypodermic injection of Liq. morphiæ *et* atropiæ, which quickly eased the pain and calmed the animal, I explored the rectum, which contained only a very small quantity of fæces; but I detected a tumefaction immediately beneath the rectum, which at first I thought must be the bladder very distended. I pressed upon it, thinking perhaps it might induce the animal to micturate, but it had no such effect. I administered an oleaginous draught and an enema of warm water, the latter being very soon rejected, and with great pain. Between the paroxysms he would feed as if nothing was the matter. On visiting my patient in the afternoon, the attendant said the horse had been easy until a short time before I arrived, when the pain became as intense as before. I adopted the same treatment; beside which, I introduced a catheter into the bladder, and evacuated about a quart of urine, but without any diminution in the calibre of the swelling. I now came to the conclusion that the swelling was a tumour of some description. So the case continued for four days—the patient sometimes in great agony, at other times apparently well to look at. He ate bran and linseed mashes, and drank linseed gruel freely. But the swelling kept increasing in size, so that the horse could not defecate without the assistance of some one to remove the fæces mechanically; and to render them pultaceous enemas of warm water were frequently given, besides an occasional dose of Ol. lini. On the fifth day, finding my patient becoming worse, and the enlargement increasing so rapidly, I feared it was an abscess which, if the animal lived long enough, would burst either in the abdominal cavity,

giving rise to Peritonitis or Pyæmia; or, if it opened into the rectum, would cause a fistulous wound in it. So, having explained this to the owner, he consented to allow the horse to be operated upon. The operation I performed as follows:—I introduced a catheter into the bladder, and withdrew its contents; then passed my left hand (having a trocar about a foot in length, and the eighth of an inch in diameter, concealed under it) about five inches into the rectum, at which part I pierced in a downward direction through its walls, this being the most prominent part of the swelling. I now withdrew my hand, and likewise the stiletto of the trocar; then fixed the nozzle of a powerful syringe in the free end of the cannula, and drew the piston of the syringe out slowly. I then removed the syringe from the cannula, and found the former containing a quantity of very fœtid pus, of about the consistency of cream. Filling the syringe with warm water, I injected it into the cannula, and again withdrew it, whereupon a continuous stream of most offensive smelling pus flowed from the cannula for fully twenty minutes. After this ceased to flow, I kept injecting warm water containing a little Acid. carbolic. into it, until the fluid which returned became as clear as before I injected it.

I then removed the cannula, and ordered that the patient should have laxative diet, and warm water enemata for a few days. The animal never afterwards manifested any pain or reappearance of the abscess.

MALFORMATION OF THE PENIS OF A BULL.

BY KIRTLAN SMITH, M.R.C.V.S., LOUTH, LINCOLNSHIRE.

THE subject of this communication had, when acquired by its present owner, Mr. Chas. Gillott, of this town, a swelling on the left side of the abdomen, in a line with the stifle. The vendor, however, had warranted it "to come all right." A few weeks afterwards, the swelling extended over the whole abdomen, and up towards the shoulder, with symptoms of mortification around the part first affected. The groom of a veterinary surgeon was at this stage called to see the animal. He made a puncture

near the median line of the abdominal integument, upon which there escaped a large quantity of a fluid like blood and water. This fluid was supposed by the owner to be urine, as the animal had been observed by a neighbour to draw his penis, apparently with great difficulty, three or four days before, and was not known to have micturated again up to the time of the operation. In two days more, a large piece of integument sloughed off the left side of the abdomen, the slough extending from the prepuce to the symphisis pubis. The bull now presents its penis uncovered, and in two portions; one part going in a natural direction to the prepuce, but having as an offshoot the other part about five inches long, protruding laterally, and through which the animal micturates. This it does in an unnatural manner, and to quote the owner's words, "like the waterworks going off." The animal is greatly emaciated. If it is slaughtered I shall be happy to state more fully the condition of the abnormal parts.

Editorial.

PROTECTIVE INOCULATION FOR TRANSMISSIBLE DISEASES.

THE recent advance made in the study of the pathology of certain transmissible and very fatal diseases of animals, opens up a new line of research and experimentation, and revolutionises to a startling degree our notions as to the nature and etiology of these maladies, but still more so, perhaps, our views with regard to their prevention—at least in their most deadly form. It is true that protective inoculation has been, during many years, more or less successfully practised for the Contagious Pleuro-pneumonia of cattle, and under conditions which, while it prevented animals being attacked with the disorder, rendered it comparatively innocuous, so far as injury to health was concerned. The discovery of microscopical organisms in Anthrax, and the experiments which clearly demonstrated that they were the active agents in producing the disease, had, however, a wonderful result for pathology and preventive medicine. Pasteur, whose previous researches on the silk-worm disease and fermentation had done so much in this direction, has led the van, in conjunction with our professional colleagues, Professors Chauveau and Toussaint, in defining the conditions upon which protective inoculation may be most effectively and safely resorted to, in several of the scourges of animals, and particularly in the so-called fowl-cholera and Anthrax. From the results already acquired, there can scarcely remain any doubt

that in the laboratory the germs of these diseases can be so cultivated that their virulency is all but destroyed; so that when inoculated in healthy creatures they scarcely produce any perceptible disturbance, though they ensure immunity from a future attack of the deadly germs. This artificial cultivation or attenuation of the virus of destructive disorders, so that by inoculation with it these no longer need be feared, is a subject fraught with the deepest importance, not only to animal but to human medicine, and is only second in point of value to the discovery of means by which the germs of disease can be completely and totally annihilated.

In veterinary science especially must it command earnest attention. Already this kind of inoculation is being largely practised for mitigating the ravages occasioned by Anthrax or Splenic Fever among the flocks in France, and in Belgium it appears to be successfully employed in Contagious Pleuro-pneumonia. In our own empire we have terrible diseases which should be easily brought under control in the same manner. In India we have the Cattle Plague (indeed, it constantly prevails throughout Asia), Sheep-pox, Loodianah Disease or Anthrax, and other similar disorders, and in South Africa we have that most destructive of all equine plagues, the Horse-sickness—inoculable and anthracoid in its nature—which sweeps off all the horses from entire districts in a single season, and Contagious Pleuro-pneumonia, destroying the cattle without let or hindrance, from the seaboard to Central Africa, while the same malady prevails almost unchecked in Australia. Then there is Swine-plague, a disease inoculable, and due to a particular germ, which in Europe and America threatens to ultimately exterminate the porcine species. Surely the startling laboratory discoveries of the last few years can be applied on a grand scale, in general practice, in order to bring the long list of animal plagues completely within the power of man, and so get rid of all the anxiety, loss, danger, and embarrassment to nations which their presence ever occasions! Not many years ago the microscope in veterinary medicine was sneered at as a silly toy. Without this wonderful instrument pathology, and even surgery, would have made but little progress, while the science of preventive medicine would scarcely have existed; every day it is throwing a flood of light upon hitherto obscure subjects. We hope and trust that the great expectations raised as to the further application of the germ theory to the transmissible diseases of animals may be fully realised. It is a grand conception, and the result is already a great victory for the scientists, who are sometimes stigmatised by the so-called practical men as "theorists."

Whether by the direct introduction into the blood of very small quantities of virus, as practised by Chauveau, or by inoculation with cultivated or specially modified virus, as carried out by Pasteur and Toussaint, a brilliant prospect is opened out for our future dealings with veritable scourges, and for this we are indebted to the microscope, no less than to experimental pathology.

THE VETERINARY SURGEONS' BILL.

OWING to the state of parliamentary business, through the obstructions raised by certain Irish M.P.'s, and the fact that this Bill was opposed, up to the 20th of August it had not passed through Committee in the Commons. The action of certain members of the profession with regard to the Bill after it had passed the second reading, had largely tended to this result. The unqualified practitioners have found their most powerful allies in our own ranks. Evidence of this will be discovered in our Parliamentary Intelligence.

On August 20th the Bill passed through Committee, and on the 22nd the third reading. Probably before this reaches our readers it will have received the royal assent, and be entered on the Statute Book. Comments must be reserved until next month.

PASTEUR ON THE GERM THEORY OF DISEASE AND ITS PRACTICAL IMPORTANCE.

AT the recent meeting of the International Medical Congress, in London, among the most remarkable of the addresses delivered was that by M. Pasteur, on the Germ Theory of Disease, which possesses more than ordinary interest for veterinary surgeons, and which, for this reason, we reproduce. After alluding to the favourable reception his discoveries had received, he says :—"I am happy to be able to thank you by bringing to your notice a new advance in the study of microbie,* as applied to the prevention of transmissible diseases—diseases which for the most part are fraught with terrible consequences, both for man and domestic animals. The subject of my communication is vaccination† in relation to Chicken Cholera and Splenic Fever, and a statement of the method by which we have arrived at these results—a method the fruitfulness of which inspires me with boundless anticipations. Before discussing the question of Splenic Fever vaccine, which is the most important, permit me to recall the results of my investigations of Chicken Cholera. It is through this inquiry that new and highly important principles have been introduced into science concerning the virus or contagious quality of transmissible diseases. More than once in what I am about to say I shall employ the expression virus-culture, as formerly, in my investigations on fermentation, I used the expressions, the culture of milk ferment, the culture of the butyric vibrion, etc. Let us take, then, a fowl which is about to die of Chicken Cholera, and let us dip the end of a delicate glass rod in the blood of the fowl with the usual precautions, upon which I need not here dwell. Let us then touch with this chaged point some *bouillon de poule*, very clear, but first of all rendered sterile under a temperature of about 115° Centigrade, and under conditions in which neither the outer air nor the vases employed can introduce exterior germs—those germs which are in the air, or on the surface of all objects. In a short time, if the little culture vase is placed in a temperature of 25° to 35°, you will see the liquid become turbid, and full of tiny microbes, shaped like the figure 8, but often so small that under a high magnifying power they appear like points. Take from this vase a drop as small as you please, no more than can be carried on the point of a glass rod as sharp as a needle, and touch with this point a fresh quantity of sterilised *bouillon de poule* placed in a second vase, and the same phenomenon is produced. You deal

* Bacteria or Bacilli.—ED. *V. J.*

† This term is evidently erroneously applied. Protective inoculation should be substituted.—ED. *V. J.*

in the same way with a third culture vase, with a fourth, and so on to a hundred, or even a thousand, and invariably within a few hours the culture liquid becomes turbid and filled with the same minute organisms. At the end of two or three days' exposure to a temperature of about 30° C. the thickness of the liquid disappears, and a sediment is formed at the bottom of the vase. This signifies that the development of the minute organism has ceased—in other words, all the little points which caused the turbid appearance of the liquid have fallen to the bottom of the vase, and things will remain in this condition for a longer or shorter time, for months even, without either the liquid or the deposit undergoing any visible modification, inasmuch as we have taken care to exclude the germs of the atmosphere. A little stopper of cotton sifts the air which enters or issues from the vase through changes of temperature. Let us take one of our series of culture preparations—the hundredth or the thousandth, for instance—and compare it in respect to its virulence with the blood of a fowl which has died of cholera; in other words, let us inoculate under the skin ten fowls, for instance, each separately with a tiny drop of infectious blood, and ten others with a similar quantity of the liquid in which the deposit has first been shaken up. Strange to say, the latter ten fowls will die as quickly and with the same symptoms as the former ten; the blood of all will be found to contain after death the same minute infectious organisms. This equality, so to speak, in the virulence both of the culture preparation and of the blood is due to an apparently futile circumstance. I have made a hundred culture preparations—at least, I have understood that this was done—without leaving any considerable interval between the impregnations. Well, here we have the cause of the equality in the virulence. Let us now repeat exactly our successive cultures with this single difference, that we pass from one culture, to that which follows it—from the hundredth to, say, the hundred and first, at intervals of a fortnight, a month, two months, three months, or ten months. If, now, we compare the virulence of the successive cultures, a great change will be observed. It will be readily seen from an inoculation of a series of ten fowls that the virulence of one culture differs from that of the blood and from that of a preceding culture when a sufficiently long interval elapses between the impregnation of one culture with the microbe of the preceding. More than that, we may recognise by this mode of observation that it is possible to prepare cultures of varying degrees of virulence. One preparation will kill eight fowls out of ten, another five out of ten, another one out of ten, another none at all, although the microbe may still be cultivated. In fact, what is no less strange, if you take each of these cultures of attenuated virulence as a point of departure in the preparation of successive cultures and without appreciable interval in the impregnation, the whole series of these cultures will reproduce the attenuated virulence of that which has served as the starting point. Similarly, where the virulence is null it produces no effect. How, then, it may be asked, are the effects of these attenuating virulences revealed in the fowls? They are revealed by a local disorder, by a morbid modification more or less profound in a muscle, if it is a muscle which has been inoculated with the virus. The muscle is filled with microbes which are easily recognised because the attenuated microbes have almost the bulk, the form, and the appearance of the most virulent microbes. But why is not the local disorder followed by death? For the moment let us answer by a statement of facts. They are these: the local disorder ceases of itself more or less speedily, the microbe is absorbed and digested, if one may say so, and little by little the muscle regains its normal condition. Then the disease has disappeared. When we inoculate with the microbe the virulence of which is null there is not even local disorder, the *naturæ medicatrix* carries it off at once, and here, indeed, we see

the influence of the resistance of life, since this microbe, the virulence of which is null, multiplies itself. A little further, and we touch the principle of vaccination. When the fowls have been rendered sufficiently ill by the attenuated virus which the vital resistance has arrested in its development, they will, when inoculated with virulent virus, suffer no evil effects, or only effects of a passing character. In fact, they no longer die from the mortal virus, and for a time sufficiently long, which in some cases may exceed a year, Chicken Cholera cannot touch them, especially under the ordinary conditions of contagion which exists in fowl-houses. At this critical point of our manipulation—that is to say, in this interval of time which we have placed between two cultures, and which causes the attenuation—what occurs? I shall show you that in this interval the agent which intervenes is the oxygen of the air. Nothing more easily admits of proof. Let us produce a culture in a tube containing very little air, and close this tube with an enameller's lamp. The microbe in developing itself will speedily take all the oxygen of the tube and of the liquid, after which it will be quite free from contact with oxygen. In this case it does not appear that the microbe becomes appreciably attenuated, even after a great lapse of time. The oxygen of the air, then, would seem to be a possible modifying agent of the virulence of the microbe of Chicken Cholera—that is to say, it may modify more or less the facility of its development in the body of animals. May we not be here in presence of a general law applicable to all kinds of virus? What benefits may not be the result? We may hope to discover in this way the vaccine of all virulent diseases; and what is more natural than to begin our investigation of the vaccine of what we in French call Charbon, what you in England call Splenic Fever, and what in Russia is known as the Siberian Pest, and in Germany as the Milzbrand. In this new investigation I have had the assistance of two devoted young *savants*—MM. Chamberland and Roux. At the outset we were met by a difficulty. Among the inferior organisms, all do not resolve themselves into those corpuscle germs which I was the first to point out as one of the forms of their possible development. Many infectious microbes do not resolve themselves in their cultures into corpuscle germs. Such is equally the case with beer yeast, which we do not see develop itself usually in breweries, for instance, except by a sort of scissiparity. One cell makes two or more, which form themselves in wreaths; the cells become detached, and the process recommences. In these cells real germs are not usually seen. The microbe of Chicken Cholera and many others behave in this way, so much so that the cultures of this microbe, although they may last for months without losing their power of fresh cultivation, perish finally like beer yeast which has exhausted all its aliments. The anthracoid microbe in artificial cultures behaves very differently. In the blood of animals, as in cultures, it is found in translucid filaments more or less segmented. This blood or these cultures freely exposed to air, instead of continuing according to the first mode of generation, show at the end of forty-eight hours corpuscle germs distributed in series more or less regular among the filaments. All around these corpuscles matter is absorbed, as I have represented it formerly in one of the plates of my work on the diseases of silkworms. Little by little all connection between them disappears, and presently they are reduced to nothing more than germ dust. If you make these corpuscles germinate, the new culture reproduces the virulence peculiar to the thready form which has produced these corpuscles, and this result is seen even after a long exposure of these germs to contact with air. Recently we discovered them in pits in which animals dead of Splenic Fever had been buried for twelve years, and their culture was as virulent as that from the blood of an animal recently dead. Here I regret extremely to

be obliged to shorten my remarks. I should have had much pleasure in demonstrating that the anthracoid germs in the earth of pits in which animals have been buried are brought to the surface by earthworms, and that in this fact we may find the whole etiology of disease, inasmuch as the animal swallow these germs with their food. A great difficulty presents itself when we attempt to apply our method of attenuation by the oxygen of the air to the anthracoid microbes. The virulence establishing itself very quickly, often after four-and-twenty hours in an anthracoid germ which escapes the action of the air, it was impossible to think of discovering the vaccine of Splenic Fever in the conditions which had yielded that of Chicken Cholera. But was there, after all, reason to be discouraged? Certainly not; in fact, if you observe closely, you will find that there is no real difference between the mode of the generation of the anthracoid germ by scission and that of Chicken Cholera. We had therefore reason to hope that we might overcome the difficulty which stopped us by endeavouring to prevent the anthracoid microbe from producing corpuscle germs and to keep it in this condition in contact with oxygen for days, and weeks, and months. The experiment fortunately succeeded. In the ineffective (*neutre*) *bouillon de poule* the anthracoid microbe is no longer cultivable at 45° C. Its culture, however, is easy at 42° or 43°, but in these conditions the microbe yields no spores. Consequently it is possible to maintain in contact with the pure air at 42° or 43° a *mycélienne* culture of bacteria entirely free of germs. Then appear the very remarkable results which follow. In a month or six weeks the culture dies—that is to say, if one impregnates with it fresh *bouillon*, the latter is completely sterile. Up till that time life exists in the vase exposed to air and heat. If we examine the virulence of the culture at the end of two days, four days, six days, eight days, etc, it will be found that long before the death of the culture the microbe has lost all virulence, although still cultivable. Before this period it is found that the culture presents a series of attenuated virulences. Everything is similar to what happens in respect to the microbe in Chicken Cholera. Besides, each of these conditions of attenuated virulence may be reproduced by culture; in fact, since the charbon does not operate a second time (*ne récidive pas*), each of our attenuated anthracoid microbes constitutes for the superior microbe a vaccine—that is to say, a virus capable of producing a milder disease. Here, then, we have a method of preparing the vaccine of Splenic Fever. You will see presently the practical importance of this result, but what interests us more particularly is to observe that we have here a proof that we are in possession of a general method of preparing virus vaccine based upon the action of the oxygen and the air—that is to say, of a cosmic force existing everywhere on the surface of the globe. I regret to be unable from want of time to show you that all these attenuated forms of virus may very easily, by a physiological artifice, be made to recover their original maximum virulence. The method I have just explained of obtaining the vaccine of Splenic Fever was no sooner made known than it was very extensively employed to prevent the Splenic affection. In France we lose every year by Splenic Fever animals of the value of 20,000,000f. I was asked to give a public demonstration of the results already mentioned. This experiment I may relate in a few words. Fifty sheep were placed at my disposition, of which twenty-five were vaccinated. A fortnight afterwards the fifty sheep were inoculated with the most virulent anthracoid microbe. The twenty-five vaccinated sheep resisted the infection; the twenty-five unvaccinated died of Splenic Fever within fifty hours. Since that time my energies have been taxed to meet the demands of farmers for supplies of this vaccine. In the space of fifteen days we have vaccinated in the departments surrounding Paris more than 20,000 sheep, and a large number of cattle and horses. If

I were not pressed for time I should bring to your notice two other kinds of virus attenuated by similar means. These experiments will be communicated by-and-by to the public."

THE ETIOLOGY OF RABIES.

THE geographical distribution of *Rabies canina* has been held by the author of "Rabies and Hydrophobia," and others, as to a large extent confirmatory of the opinion that this is a purely contagious disease, depending upon a specific virus or germ for its production, and that the malady only appears where these germs are present. Dr. Pélagaud, in a letter to the *Journal de Médecine Vétérinaire et de Zootechnie* for July, affords more recent confirmatory evidence in support of this opinion, from observation and inquiries made in the island of Reunion, in the Indian Ocean. This island is not very widely separated from the island of Mauritius, a British possession, by the sea, and is almost identical with the latter, in so far as geology, climate, flora, and fauna are concerned. In the island of Reunion Rabies is *absolutely unknown*, the oldest medical practitioner had never heard of a case; while in the Mauritius it appears to be as prevalent as in France. The reason for this, according to Dr. Pélagaud, is not to be found in any difference in the breeds of dogs, for in both islands they are pretty much the same; but because in Reunion the importation of dogs is rigorously prohibited, while in the Mauritius—subject to England, whose ideas in the matter of importation and exportation are, says the doctor, so different from those of France—the landing European or other dogs is neither interdicted nor controlled in any way. He therefore concludes that in the Mauritius Rabies has no other origin or means of propagation than contagion, and that the notions with regard to its spontaneous development have no foundation. If, he argues, the malady is not spontaneous in the islands of the Indian Ocean, it must be the same all the world over.

LITHOTOMY IN THE DOG.

AN interesting case of Lithotomy in the well-known St. Bernard bitch, "Mab," is recorded by J. Woodroffe Hill, F.R.C.V.S., Wolverhampton, who removed no fewer than 202 calculi from the bladder. These varied in size from that of a millet seed to a potato, the four largest weighing respectively three ounces, two ounces, and half-an-ounce, the whole weighing nine ounces. They were chiefly triangular in shape, and perfectly smooth and white. The operation was performed under chloroform. Mr. Hill writes:—

"I was first consulted about Mab on August 18, 1880, chiefly as to her not breeding, and a continual irritation of the urino-gen. organs. On examination I then discovered she had, in connection with her last pregnancy, sustained a vaginal injury close to the mouth of the uterus, and for which I gave instructions as to treatment. Stone at this time was not suspected. After this I did not see her again until April, when her owner informed me she had visited the dog, and I examined her as to pregnancy. After careful abdominal manipulation, a movable substance was felt, but of its nature there was some doubt. On Saturday morning last, the day of the operation, the patient was again brought to me. She was this time continually straining and passing blood and urine in small quantities. Placing her upon her back, I found the enlargement previously felt had considerably increased in size, and on grasping it crepitus was both felt and heard. As the poor creature was in evident and acute pain, at the wish of the owner, and in accordance with my own feelings about the case, I at once operated, and although it was scarcely

possible a successful issue could result therefrom, yet I felt it was justifiable when such a valuable life was in the balance, as it resolved itself into a question of relief by the only method in surgery possible, or otherwise letting her linger on in agony. Unfortunately the unfavourable prognosis I gave was realised, and poor Mab succumbed on Sunday night, patient and grateful to the last moment, extending herself for fomentation, etc., and licking my hand.

"A *post-mortem* examination revealed another large stone in the left kidney, surrounded by gangrenous structure and pus. This stone was of a ragged nature, and weighed half an ounce; and the kidney, which was only an apology for one, merely forming a thin sac for the stone, weighed barely another half-ounce. The opposite kidney, which had been doing all the work, weighed six ounces. The bladder was considerably hypertrophied, its walls being thickened to the extent of three-quarters of an inch, and cartilaginous. Its neck, in which the stone weighing three ounces had lodged, was enormously distended. Altogether the organ weighed a trifle over eight ounces. The process of healing in those parts cut in the operation, including the bladder, was well established, and had not peritonitis set in the patient would have undoubtedly recovered from it, though her span of life afterwards would have been of brief duration owing to other organic disease."

NORMALLY ABNORMAL MILK.

MEN of science have determined that it is possible to have secretions so far at variance with the natural constituents of a secretion *normal*, that the term *normally abnormal* can be accepted to convey the impression that, although the secretion is abnormal, it is normally so. The object is to impress this on the minds of members of the profession, and to record an instance of recent date, which may be interesting.

Mankind has hitherto been accustomed to repose implicit confidence in the intrinsic and unswerving honesty of the harmless, necessary cow. It seems particularly hard upon trustful natures that their faith in the moral integrity of so mild-eyed a quadruped should be shaken by the unprincipled conduct of a "milky mother" arraigned by Lord Portman before the Dorset county magistrates for wilfully violating the provisions of the Food Adulteration Acts. This unconscionable animal's owner had been prosecuted for selling milk deficient in cream, and convicted for that grave offence. But, conscious of his own innocence, and only too well acquainted with the lawless proclivities of his cow, he appealed against the decision, and invoked the aid of the Inland Revenue Department Laboratory to prove him guiltless. The official analysts, after careful examination of the criminally implicated milk, pronounced that its deficiencies were exclusively attributable to the cow from which it was obtained—a quadruped of so disaffected a disposition that she obstinately refuses to produce milk of the quality enacted by the law. Persuasion and menace have alike been employed to modify her resolve, but in vain. Her milk is officially stated to be "normally abnormal," and it appears that existing statutes, which she boldly defies, have made no provision whereby a contingency of this sort may be met. We presume that it would be useless to urge upon so hardened an offender that she is casting discredit upon her kind, heretofore universally respected, by such reprehensible behaviour. Probably swift and final retribution at the point of the butcher's knife will befall a delinquent who, not content with breaking the law and getting her proprietor into trouble, malignantly persists in setting an evil example to all other cows.

From the evidence there does not appear to have been any examination

of the "milk factor" or "machine"—the dairy cow—yielding such a sad supply of lacteal fluid; therefore the evidence appears deficient—*ergo*, the cow might have been in an abnormal condition, and this being so, she could not by any possibility yield milk normally abnormal. An examination by a qualified veterinary surgeon might have thrown light on the subject, proving the milk glands to be out of health, or the *prima viæ*.

In the examination of milk there is no man better qualified than the veterinarian who has made cattle pathology his study. Not only can he test the purity of the milk, by those deviations in the secretion as the period after calving goes on, and from his aptitude diagnose the idiosyncrasy of an animal, and by judicious treatment convert a bad yield to a somewhat normal state, as cows are fed with uniformity; but he also knows that the secretions differ until, by mixing the whole, like the fed, uniformity in milk is obtained, and not unfrequently unhealthy milk mixed with sound to the damage of the whole.

A system of veterinary inspection of dairy cows would be of advantage to the owners, made at frequent intervals at the time of milking. The trouble and expense is not great—the value of the inspection an assurance to the consumer that the milk is from sound animals, and that every care is taken.

As an instance, the Warwick Farm dairies, numbering several hundred cows, are at frequent intervals closely inspected by Mr. R. Ward, F.R.C.V.S., of Paddington, and any cow the least amiss removed, the condition reported to the proprietor, and sanitary laws strictly enforced. This innovation should recommend itself to other large dairies, for in most parts of the country there are located members of the profession who have made cattle their study. The security the consumers feel under such a system is of some importance, and fairly recompense the proprietor and the veterinary surgeon.

Now that the milk-pail has been proved to hold germs of disease, too much care cannot be exercised.

REPORT ON VETERINARY SCIENCE AND PRACTICE IN AUSTRALIA.

THE following report, forwarded too late to be read at the Congress, has been sent for publication in the Journal:—

To the Secretary of the British National Veterinary Congress.

SIR,—In accordance with your communication dated 24th November, 1880, requesting us to inquire into and report upon the state of veterinary practice and science in these colonies, we beg to forward you the following condensed report compiled from those of the secretaries, together with a number of suggestions for the general advancement of the profession.

It is our first duty to state that the steps now being taken in the mother country to secure the legal protection of the profession have met with the unanimous approval of veterinary surgeons in these colonies, and that although the passing of the "Veterinary Surgeons' Bill" will not directly affect us, it may be the means of similar protective measures being adopted here, for hitherto all attempts to obtain protection have failed, in consequence of there being none in England. The veterinary profession has never been fully appreciated in the Australian colonies for the following reasons, viz.:—

1. A large proportion of the stock-owners and farmers have had no previous experience of the management of stock in countries or parts where veterinary surgeons were available, consequently they have but a very imperfect

knowledge of the utility of the profession, and those who have endeavoured to obtain the services of veterinary surgeons have been so frequently imposed upon by men practising under assumed titles that they have been led to form very unjust opinions of it.

II. The colonial Governments being chiefly composed of a similar class of men has led to the employment of laymen and medical men in what are the legitimate duties of the veterinary surgeon only. At the present time there is not a single veterinary surgeon in the Australian colonies wholly employed in Government service. All stock inspection is done by lay inspectors, except in doubtful cases where there is great difficulty and a heavy responsibility. Then the veterinary surgeon is called in. It should also be stated that whenever a commission has been appointed to deal with outbreaks of disease in stock, etc., medical men and lay inspectors have been employed, and veterinary surgeons systematically excluded. This, we are sure, did not arise from lack of veterinary surgeons to undertake these duties, for able and worthy men have always been available; but seems to have arisen from an inability of those in power to discriminate between the legitimate duties of veterinary surgeons and those of medical men and lay stock-inspectors. The attached reports will show the correctness of these statements, and that enormous sums of money have been uselessly expended, whilst fatal maladies have continued to spread and cause heavy losses.

III. This want of recognition on the part of colonial Governments and the leading stock-owners has exerted a very depressing influence on the social status of the profession, and has led to many good men leaving its ranks for more lucrative and less harassing occupations, and the field has been thus left open to quackery, which prevails to a greater extent in this than perhaps any other country. The assumed title of veterinary surgeon and the term veterinary are so frequently associated with such occupations as horse-breaking, shoeing, and the vending of quack nostrums that there is little wonder that the public look with suspicion on veterinary surgeons.

The present state of veterinary progress in these colonies is therefore similar to what it was in England fifty years ago, but it is not the intention of colonial veterinary surgeons to allow it to remain so. Having observed the beneficial effects of the united action of members of the profession in home countries, the veterinary surgeons of Australia about twelve months ago formed themselves into an association called the "Australasian Veterinary Medical Association," which is now fully established, and has branches in all the Australian colonies. Although so recently formed, it has already done much good, and bids fair to become an important factor in raising the profession in public estimation.

Through the efforts of the association a Parliamentary Committee was recently appointed in Victoria to inquire into the Diseases in Stock Act (see report attached), with a view of adopting improved legislation; while another important object gained by its influence was to get the names of all unqualified men struck off the list of veterinary surgeons in the Melbourne Directory. The secretary is at present engaged in obtaining a list of all veterinary surgeons residing in the Australian colonies, and it is the intention of the association shortly to publish its transactions periodically.

With regard to the subjects to be dealt with by your Congress, viz., the Suppression of Empiricism, the Law of Soundness, etc., etc., we beg to offer the following suggestions:—

Suppression of Empiricism.

In order to effectually suppress empiricism we deem it advisable that the term "veterinary," in whatever form used, should be prohibited to all except qualified veterinary surgeons as a title. Once deprive empirics of their

assumed titles, we feel convinced that they would be very seldom employed in this country, and whenever, through force of circumstances, their services were sought, it would be known that they were not veterinary surgeons, and no discredit would be thrown upon the profession.

Veterinary Titles.

We would point out the desirability of distinctive titles of qualification being conferred on distinguished veterinary practitioners, as in the medical profession; for at present no inducements are held out to those who are capable and desirous of distinguishing themselves either in medical or surgical knowledge. If a veterinary surgeon has a special taste for veterinary medical science in preference to surgery, he would be likely to excel in that branch, therefore he should be enabled to acquire a title by which the public would recognise his specialty, as in the case of the human physician. Such titles as Doctor of Veterinary Medicine and Doctor of Veterinary Surgery would be sufficiently distinctive, and answer the purpose. This, we think, is quite as necessary in veterinary as in medical practice, for veterinary science has a much wider field for labour, embracing as it does such a variety of species, and that it would be highly conducive to the advancement of every branch of medical and surgical knowledge, and to the general benefit of mankind and animals. The Fellowship Degree does not meet this requirement.

Nomenclature of Diseases.

This subject requires attention, for until more rational and scientific names are given to animal diseases, there is bound to be endless confusion. We would suggest that a number of influential scientific gentlemen be appointed by the Congress to revise the nomenclature of diseases, so that each disease shall have a name by which it is generally known, instead of having so many and often absurd names.

Professional Etiquette.

Under this head we would suggest the advisability of a code of rules being drawn up by the Council of the Royal College of Veterinary Surgeons, setting forth the prominent points of professional etiquette for the guidance of members, embracing such subjects as consultation fees, etc. Each student on receiving his diploma should be supplied with a copy, and sign a declaration that he will follow them throughout his professional career, and any member known deliberately to break them to render himself liable to have his name struck off the register of the college.

Veterinary Associations.

We beg to submit that a list of all veterinary medical associations in the British dominions should be attached to the college register, with a copy of the rules of each association, and a list of its members, and that each association be empowered to appoint a board of inquiry to inquire into the conduct of any defaulting member of the profession residing in the district, whether he be a member of the association or not, and a report of the evidence to be sent to the Council of the Royal College of Veterinary Surgeons to be dealt with. We are of opinion that if some such scheme as this were adopted, it would do more to raise the status of the profession than anything else. Other matters of professional interest could be dealt with in a similar manner, and we would further suggest that each association should keep a statistical record of all breeds or strains of stock known to have hereditary taints. This information would be invaluable for reference, and would be easily collected if each member would make observations and take notes.

The Law of Soundness.

It is desirable that there should be some authentic classification of all the hereditary diseases of animals which render them unfit for breeding purposes, for many animals that are not suffering from disease themselves may yet transmit disease to their offspring, and should be considered unsound. For example, many animals exhibited at our agricultural shows, although known to possess some hereditary taints, are awarded prizes, and thus encouraged to spread disease wherever they go, and unless the animal is suffering from actual disease at the time a veterinary surgeon cannot condemn it. A classification of hereditary diseases, together with statistical and other records kept by the veterinary medical association for each district, would enable the profession to give more certain and reliable information in all these cases, and at the same time would tend to improve the different breeds of stock, and prevent a great deal of imposition and wrong.

In drawing up this report we have only briefly touched upon the subjects which we desire to bring before your Congress, but trust it will be sufficient to show that the profession in these colonies are fully alive to the necessity and importance of many radical changes being made in the internal organisation of the profession, and that it is only by the united action of members of the profession, and steady perseverance, that these objects can be attained. We therefore look forward with hope and confidence to the meetings of the British National Veterinary Congress, and trust that it may be the means of bringing about some of the changes necessary to the welfare and advancement of the profession. In conclusion, we would state that we have much pleasure in observing that the Veterinary Medical Bill is at last in a fair way for becoming law. Mr. Richard Rutherford, M.R.C.V.S., Edinburgh, has been requested to represent us at your Congress, as his residence for some time in Australia eminently fits him for the undertaking, and his personal experience will enable him to enlarge on some of the subjects touched upon.

We have the honour to be, sir, your most obedient servants,

GRAHAM MITCHELL, F.R.C.V.S., Gen. Sec. for Australia.
W. T. KENDALL, M.R.C.V.S., Victoria, Hon. Sec. A.V.M.A.
J. STEWART, M.L.C., M.R.C.V.S., New South Wales.
T. CHALWIN, M.R.C.V.S., South Australia.
J. IRVING, M.R.C.V.S., Queensland.
A. PARK, M.R.C.V.S., Tasmania.
C. A. CALVERT, M.R.C.V.S., New Zealand.
} *Secretaries.*

BRITISH NATIONAL VETERINARY CONGRESS.

HAVING already informed our readers of the brilliant success of the Congress sittings, as held in the Society of Arts' room on 20th and 21st July, we will now enter into more detail regarding the work done and the methods of procedure at this important professional gathering. We are informed that a report *in extenso* will be issued under the form of a volume of Congress "Proceedings" as soon as possible, and therefore feel it less urgent on us to do more than make the profession aware of the results. The Secretary reports as follows :—

The attendance was above what even the most zealous promoters were led to expect, and included representatives of the medical profession, of the army, of the agricultural societies, of the public and professional press, of the Royal Society for Preventing Cruelty to Animals, and so on ; and the profession from all parts of the empire was represented, either by gentlemen attending or by letter in support of the movement; also professors of the veterinary and

agricultural schools, army veterinary officers, Government veterinary inspectors, and town and country practitioners were present and actively assisted in the proceedings. The majority of the veterinary associations were represented by their officers, and the Royal College of Veterinary Surgeons by its President, members of Council, and Secretary. The arrangements made for the convenience of the Congress during its sittings included the use of the commodious and comfortable lecture theatre of the Society of Arts, the attendance of various instrument makers and druggists, with an exhibition of their most modern appliances, instruments, and preparations, and facilities for luncheon, etc. One of the most noteworthy features of the Congress was the attendance of members from such different regions of the country—Ireland, Wales, Cornwall, and other distant parts of the United Kingdom being very well represented; while delegates from the colonial schools now for the first time in the history of the profession of Great Britain took part in the deliberations of a veterinary meeting in Great Britain. Letters of congratulation and support were received from distinguished continental and other veterinary surgeons, including Franck, Müller, Wirtz, and Liautard; also a number of the honorary constituents, unable to attend, expressed their hearty accordance with the objects of the Congress, notably the distinguished Regius Professor of Medicine of Oxford University, and the no less renowned Curator of the Royal College of Surgeons, gave the meeting cordial support.

Professor Walters, of the Army Veterinary School at Aldershot, having been called to the chair at 10 a.m. of the 20th July, declared the Congress opened, and proposed that the President of the Royal College of Veterinary Surgeons should occupy the chair as President. This having been received with acclamation, Mr. George Fleming, F.R.C.V.S., F.R.G.S., etc., etc., took the seat vacated by Prof. Walters, and the proceedings continued.

The officers of the Congress were then elected.

The Organising Secretary, Mr. J. H. Steel, A.V.D., then read his "Report of the Origin and Progress of the Congress," fully explaining the manner in which it had gradually developed in spite of some difficulties and much consequent labour. This report having been received and adopted by the meeting, the President delivered a masterly address introductory to the Congress proceedings. In the course of this he showed how, exactly 120 years ago, the science of veterinary medicine was born; he traced its development in France and its extension to neighbouring countries, and at length to Great Britain. He then alluded to the most prominent features of veterinary progress in this country, culminating in the present action to obtain the passage through Parliament of the "Veterinary Surgeons' Bill." Passing to the major subjects to be brought before the Congress, he dealt with them *seriatim*, and finished his oration with wishes for the success of the Congress, since, "just as the profession shows itself ready and willing to put itself forward in the public interest, so will the public acknowledge your interests as scientific men, and as being willing to increase the public wealth and protect the public health to the best of your ability."

This oration was received with a considerable amount of applause.

Mr. J. J. Meyrick, Inspecting Veterinary Surgeon, A.V.D., then read his paper, "On Soundness of Horses: Suggestions as a Basis for Discussion on the Subject," in which he treated of several of the minor points of soundness—Splents, Bone Spavin, Bog Spavin, small hoofs, slight cases of fractured point of the hip, and slight melanotic tumours. He concluded with a suggestion "that the present Congress elect a committee to report upon the subject of soundness and unsoundness of horses." The discussion was postponed until the afternoon sitting.

The following instruments and appliances were then exhibited and explained, and their value discussed:—

By Captain Russell, of Grantham—his new suture apparatus; by Baron Smissen de Cortenberg—his check-bit for runaway horses; by Professor Robertson—his modification of the ecraseur, also the nasal insufflator; by the President—an aspirator adapted for veterinary purposes.

The Secretary then distributed copies of the papers to be read at the sittings, and made certain announcements concerning the details of Congress business, and the sitting terminated.

(*To be continued.*)

GENERAL SIR F. FITZWYGRAM'S VETERINARY PRIZES, 1882.

THE next examination for the veterinary prizes given by Sir F. Fitzwygram will take place in London, at the R.C.V.S., 10, Red Lion Square, and in Edinburgh (by the kind consent of the Directors) at the chambers of the Highland and Agricultural Society, George IV. Bridge, at 10 a.m. on second Wednesday in May, 1882.

These prizes are open to members of the R.C.V.S., who have obtained their diploma since the last examination, and who have passed with "Great" or "Very Great Credit." The examination will be both written and practical. Marks will be assigned to written answers as under:—Physiology, 300; pathology, 300; anatomy, 300. Three hours will be allowed for each of the above subjects. Sixty per cent. of marks must be obtained in each subject. Materia medica, 150; botany, 150; chemistry 150. Two hours will be allowed for each subject. Forty per cent. of marks must be obtained in each of these latter subjects.

The five best candidates, having qualified as above, will be allowed to proceed to the practical examination.

Six undred marks will be assigned to horse practice, and 600 marks to cattle.h Two hours will be allowed for the examination of each candidate in horse, and two hours for examination in cattle practice. A candidate failing to obtain sixty per cent. marks in horse practice, or forty per cent. in cattle practice will be disqualified.

The practical examination will be held at such place, and at such time as may suit the examiners and the majority of the candidates. The prizes are—1st, £50; 2nd, £30; 3rd, £20. Actual travelling and hotel expenses, notexceeding £5, will be allowed to each of the five selected candidates. The names of the intending competitors must be sent to the Secretary, R.C.V.S., four days before the date of the examination.

Further information can be obtained from the Secretary, R.C.V.S., 10, Red Lion Square, W.C.

Aldershot, *August 9th*, 1881.

Proceedings of Veterinary Medical Societies, &c.

ROYAL COLLEGE OF VETERINARY SURGEONS.

AT the several meetings of the Scottish Section of the Court of Examiners, held in Edinburgh and Glasgow on the 13th and 14th of July, the following students passed their Final Examination, and became members of the profession:—

John Rogerson.	J. G. O'Donel.	*W. J. Roberts.
W. H. Jones.	M. Y. Lees.	W. G. B. Dickinson.
*P. Dundon.	J. Taylor.	J. J. Mullally.
W. D. Hunter.	J. Wright.	

The following students passed their Second Examination at the meetings of the Scottish Section of the Court of Examiners, held in Edinburgh and Glasgow on the 11th, 12th, and 13th July :—

*B. D. Pierce.	J. E. Tudor.	C. S. Barnes.
*W. Welsby.	T. F. Coleman.	*G. Hutchinson.
M. P. Walsh.	J. McLaren.	E. H. Hallam.
J. Anderson.	J. N. Barber.	D. O'Leary.
J. A. Braddell.	W. M. Lyon.	*J. F. Hayes.
J. Pow.	G. C. O. Fowler.	P. D. O'Connor.
R. Grossart.	E. L. Ackroyd.	G. A. Herron.
	J. M. Magill.	

The following passed their First Examination at the meetings of the Court of Examiners, held in Edinburgh and Glasgow on the 15th, 16th, 18th, and 19th July :—

A. Waugh.	*R. J. Hicks.	F. A. Cuthbert.
T. Barker.	J. Philip.	*J. Faulkner.
*R. Miller.	A. E. Hanson.	J. S. Dodgson.
C. T. Laing.	*M. H. Hayes.	P. J. Culhane.
M. A. Brown.	*B. A. Claney.	W. Scott.
J. Hackett.	A. B. Forsyth.	T. W. Carnachan.
R. J. Urquhart.	R. Bolster.	T. Marriott.
*H. A. Fulham.	*A. Macormick.	A. Reid.
H. M. Maxwell.	D. J. O'Sullivan.	R. McNair.
W. F. Anderson.	T. Platt.	R. E. Weir.
W. Franklin.	W. Kirk.	M. B. Scouler.
D. Leonard.	J. W. Bennett.	J. Holland.
W. Jeeves.	A. E. Darwell.	G. McGregor.
H. L. Ferguson.	J. A. Meredith.	J. M. Johnson.
D. J. Barry.	D. Hamilton.	T. F. Craig.
T. Bell.	*W. R. Davis.	J. Laithwood.
C. S. Pinart.	T. A. Porteous.	W. Frazer.
B. D. Pierce.	H. Young.	H. Tweedley.
T. H. Rockfort.	J. Young.	J. Spalding.
F. W. Kendall.	J. Hanbury.	J. J. Ross.
R. E. White.	C. Gruty.	J. Larkin.

N.B.—* Marked thus passed with "Great Credit."

THE NEW VETERINARY COLLEGE, EDINBURGH.

At the meetings of the Court of Examiners of the Royal College of Veterinary Surgeons, held in Edinburgh on the 13th July, the following students were admitted members of the profession.

Mr. W. G. B. Dickinson	Boston.
„ W. J. Roberts*	Oswestry.
„ J. J. Mullally	Tipperary.

The following passed their Second Examination at the meeting of the Court, held on the 11th July.

Mr. Barnes.*	Mr. O'Leary.
„ Hutchinson.*	„ Barber.
„ McLaren.	„ Hallam.
„ M. Lyon.	„ Ackroyd.
„ G. Fowler.	

The following passed their First Examination at the meetings of the Court, held on the 16th and 19th July.

Mr. Hickes.*	Mr. J. Young.
Capt. M. H. Hayes.*	„ Dodgson.
Mr. Clancy.*	„ W. Scott.
„ Philip.	„ F. Cuthbert.
„ Kendall.	„ Bolster.
„ Hanson.	„ McCarmack.*
„ White.	„ O'Sullivan.
„ Forsyth.	„ Platts.
„ Faulkner.*	„ Bennett.
„ Gresty.	„ Darwell.
„ Bell.	„ Meredith.
„ Culhane.	„ Hamilton.
„ Hanbury.	„ Davis.*
„ H. Young.	„ Porteous.

* Marked thus passed with Great Credit.

The medals granted by the Highland and Agricultural Society of Scotland, Mr. Falconer King, and the certificates of merit granted by the Principal, were awarded as follows :—

Chemistry.—Silver Medal—Mr. Colin Gresty. Mr. Falconer King's Silver Medal—Mr. W. R. Davis.

Botany.—Silver Medals—Messrs. Davis and Gresty (equal). Certificate of merit—Mr. S. A. Porteous.

Materia Medica.—Silver Medal—Mr. Davis. Certificate of merit—Messrs. R. J. Hickes, and C. Gresty.

Dr. J. Hamilton, M.B., F.R.S.E., L.R.C.P.E., Pathologist to the Edinburgh Royal Infirmary, has been appointed Professor of Practical Pathology and Morbid Anatomy.

Mr. James Hunter, F.R.C.S.E., L.R.C.P.E., Lecturer on Physiology, Edinburgh Medical School, has been appointed Professor of Physiology and Practical Histology, in the place of Dr. Young, resigned.

Army Veterinary Department.

Gazette, July 26th.

VETERINARY DEPARTMENT.—Veterinary Surgeon, First Class, J. J. Meyrick to be Inspecting Veterinary Surgeon, vice A. J. Owles, retired. The undermentioned gentlemen to be Veterinary Surgeons, on probation : J. R. Beech, R. W. Burke, J. H. Riches.

Gazette, August 23rd.

VETERINARY DEPARTMENT.—The promotion of Veterinary Surgeon, First Class, J. J. Meyrick, to the rank of Inspecting Veterinary Surgeon is postdated to June 29, 1881. Veterinary Surgeon on probation A. Baird to be Veterinary Surgeon. The undermentioned Veterinary Surgeons to be Veterinary Surgeons, First Class :—W. Walker, M. F. M. Case, S. Knott, W. D. Sartin, S. R. Sartin, R. Rowe.

Obituary.

THE death is reported of Thomas Avis, M.R.C.V.S., hospital surgeon at the Royal Veterinary College, London. Mr. Avis graduated so recently as 1877, and gave promise of being an excellent member of the profession His death is a subject for deep regret.

Parliamentary Intelligence.

House of Commons, July 28th.

THE VETERINARY SURGEONS' BILL.—Sir EDWARD WATKIN: On motion for going into Committee on Veterinary Surgeons' Bill, to move, "That this House will, upon this day three months, resolve itself into the said Committee."

Mr. WARTON: On motion for going into Committee on Veterinary Surgeons' Bill, to move, "That this House will, upon this day three months, resolve itself into the said Committee."

Mr. JOSEPH COWEN: On motion for going into Committee on Veterinary Surgeons' Bill, to move, "That this House will, upon this day three months, resolve itself into the said Committee."

Mr. T. P. O'CONNOR gave notice that in Committee on this Bill he would move to add to clause 4 the following proviso:— "A person designated a Licentiate of the Royal College of Veterinary Surgeons shall be furnished by the Council of the said College with a form of certificate bearing the arms of the said College, stating that such a person is registered a 'Licentiate of the Royal College of Surgeons, to practise the Art and Science of Veterinary Medicine and Surgery,' and signed by the President, Treasurer, and Secretary of the Council of said College."

Mr. J. N. NICHOLSON: On motion for going into Committee on Veterinary Surgeons' Bill, to move, "That this House will, upon this day three months, resolve itself into the said Committee."

IN COMMITTEE ON VETERINARY SURGEONS' BILL.—Mr. WHITLEY: Page , leave out clause 15.

House of Commons, August 3rd.

THE SIBERIAN PLAGUE.—Mr. BIRKBECK asked the Vice-President of the Council whether his attention had been called to the report of Mr. Shear, relative to the Siberian Plague, and the extreme danger of its spreading to our flocks, and also the danger of fatality to the wool-sorters; whether it was a fact that upwards of 100,000 bales of Eastern wool were annually imported into England, and proved to be capable of much danger; and whether he had considered, in view of its dangerous properties, the desirability of prohibiting the sale of the sweepings from the manufacturers' sorting-rooms, and also the sale of the old bags.

Mr. MUNDELLA: Mr. Shear's report has been considered by the Veterinary Department, and Professor Brown has written a memorandum on the subject, which I propose to lay upon the table. Outbreaks of "Anthrax" are not uncommon in Russia, and have occurred occasionally in this country, although the disease has not generally extended beyond the farm where the outbreak took place. There is only a single instance recorded where the disease arose on lands which had been partly manured with refuse from woollen factories. Under these circumstances there does not appear to be any necessity for the prohibition suggested by the hon. member.

House of Commons, August 12th.

VETERINARY SURGEONS' BILL.—AMENDMENTS.—Mr. NEWDEGATE: Clause 4, after "examination," insert, "in England of the students attending the Royal Veterinary College." After clause 19, insert the following clause (saving rights of the Royal Veterinary College). "Nothing in this Act shall affect the Charter and supplemental Charter granted by Her Majesty to the Royal Veterinary College in the years 1875 and 1877 respectively, or of any of the property, rights, powers, and privileges of that College thereunder."

Mr. MUNDELLA: Clause 10, after "death," omit present words, and insert, "and on the receipt of such certificate the registrar shall erase the name of

such person from the register of veterinary surgeons, and shall transmit to the said registrar of deaths the cost of such certificate and transmission."

Mr. CHARLES JAMES: Clause 19, at end add, "Provided, that the fees chargeable under this section shall not exceed the registration fees of the Royal College of Veterinary Surgeons.'

House of Commons, August 15th.

THE VETERINARY DEPARTMENT OF THE ARMY.—Mr. GRAY asked the Secretary of State for War what was the rule regulating the promotion of officers in the Veterinary Department of the Army, and whether promotion was habitually given according to seniority, or otherwise.

Mr. CHILDERS said: The regulation governing the promotion of veterinary surgeons is in these words, "Promotion shall be solely by selection, on the ground of ability and merit, due consideration being given, however, to length of efficient service." In the case of equal merit, preference is given to length of service.

House of Commons, August 16th.

VETERINARY SURGEONS' BILL.—Mr. BIDDELL: On motion for going into Committee on Veterinary Surgeons' Bill, to move, "That this House will, upon this day three months, resolve itself into the said Committee."

House of Commons, August 20th.

THE VETERINARY SURGEONS' BILL passed through Committee after several amendments had been made.

House of Commons, August 22nd.

THE VETERINARY SURGEONS' BILL passed the third reading.

House of Lords, August 24th.

VETERINARY SURGEONS' BILL.—The Commons Amendments to this Bill were considered and agreed to.

(These amendments in no way interfere with the Bill, which has not been altered since it entered the Commons, and all the opposition to it—at one time most formidable—was removed before it went into Committee. It is now an Act in force.)

Jurisprudence.

IMPORTANT HORSE-WARRANTY CASE AT PENZANCE.

AT the Penzance County Court on July 13th, before Mr. Montague Bere, Q.C., judge, an action was tried in which William Mann, of St. Buryan, sought to recover £50 from John Stephens, veterinary surgeon, of Penzance, for a wrongful warranty of a horse. Mr. Wellington Dale was for the plaintiff, and Mr. Bridgman, of Plymouth, for the defendant.—The plaintiff's case was that in March last, being about to purchase an entire horse, he asked the defendant to examine the animal with a view to giving a certificate as to its condition. It was accordingly examined on the 19th of March, but as it was then "roaring" and suffering from an unsound hock, the defendant declined to pass it, and arranged to see it again at a subsequent date. The plaintiff particularly asked him to be very careful about the matter, as he was giving a big price for the horse, and told him that unless he could give a satisfactory certificate at the next examination he must give up all idea of

making the purchase as it would be too late for the season. A day was fixed for the next examination, but the defendant did not attend at the appointed time. On the following day, however, he told the plaintiff that he had seen the horse during the night, had found it perfectly sound in every respect, and that Mr. Mann would have a good bargain in getting it for £80. At the same time he gave a certificate that "the horse was well made and a thoroughly sound one in wind and limbs and all other respects." On the faith of this certificate the purchase was made, but on the same evening the plaintiff found that the horse was a roarer and was still bad in the wind as on the 19th of March.—His Honour: But roaring does not affect the wind. He must have been galloping very hard for the plaintiff to have found that out on the same evening.—Mr. Dale went on to say that there was something also wrong with the hock, and Mr. Mann noticing the same defects on the following day, called Mr. Stephens's attention to it, and the latter told him to exercise the horse gently. This was done, but it did not get any better, and when Mr. Stephens saw it again he himself pronounced it to be a roarer. On the 18th of April it was examined by Mr. Olver, veterinary surgeon, who certified, "I find he is a roarer, and does not flex his hocks properly, consequently unsound." Mr. Olver would also state that he never saw a worse roarer in his life, and that the horse must have been a roarer when examined by Mr. Stephens on the 31st of March.

His Honour: You must prove to me that there was such gross negligence on Mr. Stephens's part that any man holding himself out as an instructed and educated veterinary surgeon ought to have seen it and discovered it. But the mere fact that roaring existed on a particular day, was certified not to have existed on another day, and then seems to have been reproduced, would not make me come to that conclusion.

Mr. Dale: But he undertakes to exercise a reasonable degree of skill and care.

His Honour: But you must show there was such negligence that no properly educated veterinary surgeon ought to have overlooked the unsoundness.

Mr. Dale said the question would arise as to what was a reasonable degree of skill and care. He was in a position to prove that the mother of this horse was a roarer.

His Honour: That is no use. What on earth is the use of proving that? You must prove that on the 19th of March the horse was a roarer. Mr. Stephens examined him on the 31st March, and said he was not a roarer at that time, and you will have to show that on that day the disease was so apparent as to have made it necessary for an ordinarily capable veterinary surgeon to have discovered it.

Mr. Dale said he should prove that it was apparent to the inexperienced eye of the plaintiff when the horse came into his possession, and in that case it ought to have been apparent to the defendant.

His Honour pointed out that roaring did not necessarily prove unsoundness. It had been well laid down by Lord Ellenborough that if roaring were the cause of such disease, the existence of which would practically diminish the usefulness of the horse, then that roaring caused unsoundness. But unless that could be proved roaring was not unsoundness. In the case of Basset and Collins, decided in 1810, Lord Ellenborough said, "It has been held that roaring is not necessarily unsoundness, and I entirely concur in that opinion. To prove a breach of warranty the plaintiff must show not only the existence of roaring, but that the roaring is symptomatic of disease."

Mr. Thomas Olver, veterinary surgeon, was then called. He said he saw the horse on the 18th of April. He found that he had a peculiarly stiff action

in moving his hocks. He made a threat to strike him with his stick, when the horse grunted, and he at once came to the conclusion that he was a roarer. He then had him out in the field and galloped him, and this confirmed him in his opinion.—By his Honour: I cannot tell how long the disease had existed that caused the roaring. Roaring is not necessarily a thickening of the top of the windpipe. There are various causes that produce it.—His Honour: Are you of opinion that roaring is transmitted from sire or dam to colt or filly? A. I have not the slightest doubt about it; I can prove it.—His Honour: There are people who have doubts.—Mr. Olver: I believe very few educated men in our profession have the slightest doubt about it.—His Honour: Are all Prince Charlie's colts roarers?—Mr. Olver: No, not all of them, but many of them are.—His Honour: Then you do not say it is necessarily hereditary.—Witness: Oh, no. No disease is necessarily hereditary, but it is undoubtedly hereditary all the same.—By Mr. Dale: The horse roared very badly on the 18th of April, but I do not say it must necessarily have been a roarer on the 31st of March. The defect in the hock might probably pass off again, but I consider any defect of that kind is unsoundness.

His Honour: Do you go so far as to say that a defect not likely to injure the horse permanently is unsoundness?—Yes; it is unsoundness while it exists. A horse may be lame to-day and sound to-morrow, but I should not like to pass it as sound if it were lame to-day.

Mr. Bridgman: Would you be surprised to know that three veterinary surgeons have seen the horse this morning, and are prepared to certify that it is perfectly sound in limb? No; I should not be at all surprised. I will not swear the horse was necessarily unsound on the 30th of March, although it was so when I saw it on the 18th of April. Roaring may be temporary, but in this case I believe it will be permanent.

His Honour here said he did not wish to stop the case, and at his suggestion the defendant was called before any further evidence was taken on the other side.—Mr. Stephens stated that he examined the horse on the 18th of March, and had it galloped, but it was breathing too quickly, and he declined to pass it on that occasion. It was coughing, but there was nothing to indicate that it was a roarer. On the 30th of March he saw it, and again examined and tested it very carefully, adopting all the usual methods. He adopted more than the usual precautions because of the condition of the horse on the first occasion of his seeing it. He came to the conclusion that the horse was perfectly sound in wind and limb, and he would swear that it was so on his second examination. There were numbers of cases on record in which horses had suddenly become roarers, and he discovered this one to be a roarer on the 14th of April. He said unhesitatingly that it became a roarer between the 30th of March and the 14th of April.

His Honour then said he had Mr. Stephens examined in order that the view he had taken early in the case might be confirmed. For the plaintiff to support this action he must prove that the defendant acted as no intelligent and properly educated veterinary surgeon would have done when he examined the horse on the 30th of March, and that he did not exercise a reasonable amount of skill and intelligence. But at the end of Mr. Olver's evidence he came to the conclusion that there was little if any evidence against Mr. Stephens at all. Mr. Stephens had now given his own account of the transaction, and he had given his evidence very clearly and straightforwardly. It was evidence in which implicit confidence could be placed, and being of opinion that the plaintiff had failed to make out his case, he gave a verdict of non-suit.

Correspondence, etc.

A RETROSPECT OF THE BRITISH NATIONAL VETERINARY CONGRESS OF 1881.

SIR,—The assembling of all learned societies in congress has now become general in Great Britain, the initiative being obtained by precept from continental Societies.

The advantages derivable from the assemblies have been made so manifest that, like a rage, the congresses of 1881 will be historically recorded as the year of congressional mania.

That the veterinary profession has not been permitted to stand aloof, as the only liberal science indifferent to the movement, we have every reason to congratulate ourselves, thanks to the fagging of two of our earnest young members of the profession—Messrs. Steel and Banham, to whose activity and determination the success of the congress is mainly due.

The profession, from its proverbial apathy—which, like a chronic disease, seems adherent—will not stir itself, and it is only when such excellent jockeys as Steel and Banham mount the "body corporate," and by expenditure of much pen, ink, and paper, they manage, with "*Archerlike skill*," to ride the profession to the front.

When the profession arrives at the front, what a *formidable* front she presents (may I be pardoned for qualifying "front" with an adjective, should any one object to it)! These Congress meetings will have one advantage—they will expose the lethargic, apathetic, dormant, stagnant, or retrograde limbs of the body corporate, and either rouse them to energy and emulation, or to stand aside, no longer an *impedimenta* to professional progress.

The absence of the principals of our various teaching schools, and several professors, was much commented upon, not alone by those in the profession, but outside of it; Professors Robertson and Axe, of the London school, being alone; the former contributing an excellent paper on the "Influence of Disease in Animals on Man," and the latter entering with much earnest sagacity into the discussion on unsoundness in horses brought about by Mr. Meyrick's paper. Now I take it that both these gentlemen displayed tangible evidence of their devotion, not only to the profession and its advance, but to the members who had come long distances by sea and land to attend the Congress. These must have returned home with happy reminiscences of the meeting, and these two professors in particular.

The heavy work of large practices, and the concomitant responsibilities, must really be accepted as the excuse for the absence of our flourishing London practitioners, Mr. Batt, sen., and Mr. J. R. Cox being the only two I noticed who sat out the meeting. I may be wrong, and hope I am in this statement: others may have popped in, peeped, and popped out again unnoticed.

The attention and punctuality of the rural practitioners was noticed by all, and many of these have practices with duties of the highest importance, and for the nonce entrusted to the son or assistant: they came to feed on the ideas and aspirations of others, and add their *quota* in return.

Reunion—a state of things much to be desired with us, important to all societies if they are to flourish—may be developed by these Congress meetings, although the news enubilated by the President (Mr. Fleming) concerning the "blocking" of the Veterinary Bill in Parliament, through the influence of a few members of the profession—one or two of whom, I am told, being members of Council, but I trust I am misinformed for the Council's sake, the integrity of which should, and must be, above suspicion.

The members of Congress, to a man *almost*, held that the Bill should be pushed on this present session; and on reflection I must say I feel its importance, now the fact has been patented that we have not the exclusive right to the title of veterinary surgeon.

Naturally it will follow that as soon as the quacks find the Bill is thrown out, they will infer that a year or two must elapse ere another Bill can be introduced, and the present legion of them will be considerably reinforced by the advent of another Bill; and our indomitably persevering President will regret he ever attempted to assist the profession out of its "quagmire of quackery," and in all probability throw up the Bill altogether, which, after the recent *exposé*, no one will touch.

Imagine our own enemies only to be our own selves!! I hardly question that the Commissioners in Lunacy would doubt our sanity as a competent corporate body, to mind our own affairs and interests, after the remarks from the presidential chair at Congress.

The reflections cast on the profession must not be pleasing if we are thus divided, and now that the period of revolution in all liberal sciences has arrived, our profession must receive the *shock* with the rest; if she is true to herself we shall stand, if not, great will be the fall. Our position as scientific, educated men must be taken, and the time is *now*. Quacks are to be registered as practitioners; the gulf between the qualified and unqualified made very narrow—indeed, almost obliterated in a legal sense; so that we must move ourselves to attain our former position.

It has over and over again been remarked that the union of the educated veterinarian with medical practitioners is most desirable, not for either profession in particular, but for the general welfare and culture of both. To bring about this union, the institution of a Congress at short intervals is most likely to prove the means to the end.

Subjects well worked out and afterwards discussed must tend to place those members of the profession able to grasp a subject in the position due to them, and thus the unqualified man will be farther off than ever, although registered.

I truly think the association of the farrier's shop, smithy, and drug store, in a kind of *multum in parvo* style, by members of the R.C.V.S., has much to do with associating the profession with quackery; for it displays a rule-of-thumb, rough-and-tumble kind of practice to the intelligent looker-on. The unqualified has his forge to get the foot, then having the foot, he has a good chance of getting the bodily ailments to treat. Our qualified man does the same, with the same object in view. It is in Great Britain only that the association of a blacksmith's trade is tolerated; on the Continent it is *infra dig*. So long as it continues in this country, the veterinary surgeon will retain his mediocral position, and in but rare instances rise out of it, and then only when dubbed "professor."

The establishment of a British National Veterinary Medical Association, a parent to adopt the children scattered all over the kingdom, may by congressional meetings do much to remove prejudices unfortunately existing both inside and outside the profession, and as a sequence, place veterinary science and its practitioners in the position they should occupy in Great Britain.

Yours truly,

London, W., *August 12th*, 1881. ROBERT WARD, F.R.C.V.S.

THE ENEMIES IN OUR MIDST.

SIR,—There can be no doubt that there exists a small clique in the profession in this country, who are sworn enemies to its best interests. The clique is absolutely insignificant, either in point of numbers—its members might be counted on the fingers of both hands—or in worth, and is formidable only because of the shifts it resorts to to compass its ends, the way in which it tries to attain these ends, and its malignancy. This is well displayed in the efforts it has made to prevent the Veterinary Surgeons' Bill becoming law. No one can deny the vast benefits such a measure would confer; but the clique are the opposite of progressive, and care nothing for the present or future welfare of the profession so long as they can indulge in their evil ways, and oppose what they call "innovations," which are really attempts to raise the profession beyond the level of the horse-shoer. I am given to understand that the Bill is jeopardised by the efforts of Mr. Stephenson, of Newcastle-on-Tyne, who had the audacity to put himself forward for election as a member of Council last May. I fancy if the profession had known the lines he has been working on, he would have had only his own vote to record. I will not attempt to explain Mr. Stephenson's determined opposition to the Bill on physiological or phrenological principles, as some people might try to do, but point out one fact which I think may go some way to account for it. Before me lies a billhead, and on it I find "C. Stephenson and Son, Veterinary Surgeons and Horse-shoers, Newcastle-on-Tyne." Now, there is only *one* C. Stephenson, of Newcastle-on-Tyne, on the register of the Royal College of Veterinary Surgeons. So it seems there be two Richmonds in the field—both veterinary surgeons and *horse-shoers*, but only one is a member of the profession. May this fact not be at the bottom of the virulence displayed against the Bill in this quarter?

It came out at the Congress meeting in London, that three members of Council of the Royal College were also using their utmost endeavour to have the Bill thrown out, but were acting in an underhand manner, and without acquainting the Council. These members were announced to be Messrs. Reynolds and Morgan, of Liverpool, and Mr. Peter Taylor, of Manchester. I do not know exactly on what their objections to the measure are founded, but I know that at a meeting in Liverpool, many months ago, long before the Bill was drafted, Mr. Morgan denounced it as a "mockery," as I fancy he denounces everything else likely to confer benefit. He appears to be nothing more than a fault-finder, an easy function, and cannot lay claim to be a fault-mender. Well, sir, in order to account for the hostility of these three gentlemen to the Bill, I turn to the report of the election of President of the R.C.V.S. for the current year. Mr. Morgan opposed the re-election of last year's President—on *principle*, as he would have us believe—and proposed Mr. Peter Taylor as President, Mr. Reynolds seconding the proposal. It is therefore somewhat curious to find these three members of Council conspiring—on *principle* also, we suppose—against the Bill, and acting surreptitiously in opposition to the Council, the representatives of the profession. In whatever way the profession in the north of England may act towards Mr. Stephenson (we can fancy how the medical profession would treat such an individual), there should only be one way of dealing with members of Council who betray the confidence reposed in them; and it is sincerely to be hoped that the Council will rise to the occasion. If not, then the profession itself must remember what has occurred when election time comes round. The Council should be composed of intelligent, straightforward, and honest men, the best the profession can produce—not members of the *clique*, nor occult enemies of everything except what pertains to the horse-shoeing fraternity. It is high time the

composition of the Council should be seriously considered; at present it can only be described as motley and uneven, if not faulty in the extreme. The strength of a chain is that of its weakest link; the Council has several dangerous links, if the evidence of recent events is to be received.

Yours respectfully,

August 12th. "LANCASHIRE."

THE PATHOLOGY OF NAVICULAR DISEASE.

MR. EDITOR,—In your note in reference to my article on the Pathology of Navicular Disease, in this month's VETERINARY JOURNAL, I find on referring to the *Veterinarian*, 1870, page 186, you stated the same in reference to the anatomy of the joint and the pathology of the disease as you have stated in this month's Journal; and, on page 287, I replied that I had thoroughly examined the cartilage microscopically on each surface of the navicular bone, and that I generally found a few fibres interspersed in the substance of the cartilage on the inferior surface, but not sufficient to constitute it fibro-cartilage such as exists between the vertebræ, the inarticular discs on the tibia, maxillary, margin of the acetabulum, and other joints. In aged animals, articular cartilage has a tendency to become fibrous.

The disease constituting spavin, navicular disease, and ulcerated joints, the effects of external injuries near the joints (direct injury to the capsule of the joint excepted), commences in the bone, and extends to the soft tissues of the joint, and does not, as conjectured by some persons, commence in the soft tissues and extend to the bone. I also stated in my reply, in 1870, that I should be exceedingly obliged to Mr. Fleming if he would show me specimens to support his views, and I now repeat the same, and also state that I shall be pleased to show him, or any other of the profession, more than two hundred specimens in support of my theory. I have one specimen where both surfaces of the cartilage are ulcerated.

The only reason I can assign for the disease affecting the under surface of the bone, to the almost entire exclusion of the other articulary surfaces, is, that that face of the bone is the first to become affected when its natural healthy supply of blood is interfered with. As we become better acquainted with the process of congestion, inflammation, healthy nutrition, and diverted nutrition, we shall then be better able to prevent disease.

Yours truly,

Bath, *July 11th*, 1881. THOS. D. BROAD.

[It is needless to prolong a discussion when neither party will be convinced. It may be only necessary here to repeat that there is no *navicular joint* or *articulation;* that the postero-inferior face of the navicular bone—that in contact with the flexor perforans—is *not* covered with *articular* or *hyaline cartilage*, but with *true white fibro-cartilage*, such as covers other bones (sesamoid, for instance) over which tendons play. This any one can easily ascertain for himself, even without the microscope. Therefore the identity in pathology which Mr. Broad seeks to establish between ulceration as affecting the hyaline cartilage of joints and navicular disease, cannot be maintained on anatomical grounds. We have shown diseased bones for years, the appearances of which undoubtedly proved the correctness of the views we entertain as to the pathology of the malady, and such specimens will be found in every veterinary museum. There are many serious objections to Mr. Broad's view—anatomical, clinical and pathological—and these objections cannot be removed by the arguments as yet brought forward. Disease in the navicular bone and bursa does not differ in its

processes from disease in other bones in connection with bursæ. The specimen we showed at the Tunbridge Wells Meeting of the Southern Counties Society was a case of traumatic navicular disease (accidental opening of the navicular bursa), in which the lesions were in no respect different from those of the disease as we usually observe it.]

PROTECTION TO VETERINARY SURGEONS IN SOUTH AUSTRALIA.

SIR,—It is earnestly hoped that when a penal Act is obtained, and the Veterinary Surgeons' Bill becomes law, both measures will embrace the Australian colonies; as at present the profession is hampered with a number of empirics with whom there are no means of dealing otherwise than exposing their gross ignorance, which is a most unsatisfactory state of things. Moreover, Veterinary Surgeons in these colonies are compelled to serve on juries, and when the exemption, as provided in the Charter, was pointed out to a presiding judge at criminal sittings, he maintained the Act did not apply here. On behalf of the Australasian Veterinary Medical Association (of which I have the honour to be honorary secretary, South Australian branch) it is sincerely hoped you will use your powerful influence to bring about so desirable a result. I remain, sir, yours most truly,

THOMAS CHALWIN, M.R.C.V.S.,
Hon. Sec. A.V.M.A., South Australia.

Adelaide, South Australia, *June 8th*, 1881.

[We heartily sympathise with our colonial *confrères*, and regret we cannot aid them. Protection must be sought from the Colonial, not the Imperial, Government. The success we have met with here should be a strong precedent, and a guarantee of similar success to them, as our Act is a proof of the necessity for such a measure.—ED. *V. J.*]

A CORRECTION.

DEAR SIR,—Some victories are uncommonly like defeats. Of few undertakings could this more truly be said than of your correspondent "Edward Stanley's" secret campaigns against the contributions which have enlisted my name in your pages, amid all against one which appeared in May last. His defeat is threefold: first, as seen in his attempt to controvert my statements by the force of a flippant letter signed "Edward Stanley;" second, in the vitiated taste of throwing in another letter, under the covered title of "*Pupil, not Assistant*, W. Anderson," in order to vindicate his former project by a collusion with his assistant; and, lastly, in the arguments used.

So that an expression of the general opinion aroused, at the time when his first letter appeared, among those practitioners best acquainted with the subject of Lameness, may be made manifest, my friend Mr. Dollar, of London, took up the points advanced through the medium of your Journal, which vetoed the censure given me by an extensive concensus of opinion in favour of my diagnosis. But now the putative assistant, now "*pupil, not assistant*," is induced to say in another matter that, "on Mr. Burke being asked by Mr. Stanley whether he could see anything wrong with the mare, he said, 'No,' when Mr. Stanley told him she had a dead foal in her"! This is an assertion *ipse dixit*, not proof; for I was never asked any such question, and consequently remained mute, though not a little surprised, in the

matter throughout, the mare at the time performing hard work, as I had occasion to myself witness; and what I afterwards described of the case in the VETERINARY JOURNAL for May lays claim only to the *diagnosis of the cause of death, Septicæmia, elicited as the result of the necropsy made by me* at the request of Mr. Stanley.

Allow me space to subscribe myself, Sir,

Your most obedient servant,

RICHARD W. BURKE, M.R.C.V.S., A.V.D.

Edinburgh, *7th July*, 1881.

P.S.—As to the second case described, my opinion was no less inadequate than that of Mr. Stanley when he calls it "Vaginitis." The symptoms noted by me—viz., the frequent micturition, the constant straining, and the increased mucous discharge from the vagina—would indicate the existence of Vaginitis, and therefore the designation "Vaginitis" *per se* suggests an idea neither novel nor original. Probably if Mr. Stanley would kindly peruse "Veterinary Obstetrics" somewhat carefully, he would find a reasonable clue to the *cause* of this condition.

CORRIGENDA.

IN the Journal for July, in article on "Surra," at page 2, line 17, for "inflammatory" read "non-inflammatory"; page 3, line 4 from bottom, remove full stop, and in following line substitute "w" for "W," so as to read, "though it remains more or less capricious with regard to grain"; page 6, line 13 from bottom, for "layer" read "fluff."

Communications, Books, Journals, etc., Received.

COMMUNICATIONS have been received from T. W. Mayer, Aldershot; W. T. Kendall, Victoria, Australia; R. W. Burke, A.V.D.; J. W. Hill, Wolverhampton; J. B. Wolstenholme, Manchester; K. Smith, Louth; W. Williams, Edinburgh; R. Rutherford, Edinburgh; T. D. Broad, Bath; T. Chalwin, Adelaide; C. Gresswell, Nottingham; "Lancashire"; J. H. Steel, A.V.D., Woolwich; M. Hedley, Dublin; F. Blakeway, Stourbridge.

BOOKS AND PAMPHLETS: *E. Nocard*, De la Leucocythemie; *M. Peuch*, De la Garantie dans les Ventes d'Animaux de Boucherie; *P. Heu*, Les Victimes de la Rage; *D. Vallada*, Elementi di Giurisprudenza Medico Veterinaria; *N. Lanzillotti-Buonsanti*, Primo Congresso Nazionale, etc., Italiani; *C. G. H. Erdmann, und C. H. Hertwig*, Thierärztliche Receptirkunde und Pharmakopoë; *J. J. Meyrick*, Hindustani Instructions in Veterinary Medicine; *E. Dele*, Ueber das Rind von Nordamerika.

JOURNALS, ETC.: *Pen and Plough; The Squire; La Presse Vétérinaire; American Veterinary Review; La Clinica Veterinaria; Der Thierarzt; Journal de Médecin Vétérinaire et de Zootechnie; Wochenschrift für Thierheilkunde; Recueil de Méd. Vétérinaire; Annales de Méd. Vétérinaire de Bruxelles; Lancet; L'Echo Vétérinaire; Live Stock Journal; Field; Chicago Live Stock Journal; Medical Press and Circular; Farmer; Agricultural Gazette; Mark Lane Express; Edinburgh Medical Journal; Archives Vétérinaire; Revue Vétérinaire; Archiv für Thierheilkunde; Repertorium der Thierheilkunde.*

NEWSPAPERS: *Lahore Civil and Military Gazette; North British Agriculturist; Scotsman; Manchester Guardian.*